TANKS OF D-DAY 1944

Armor on the beaches of Normandy and southern France

STEVEN J. ZALOGA

ILLUSTRATED BY FELIPE RODRÍGUEZ

NEW VANGUARD 296

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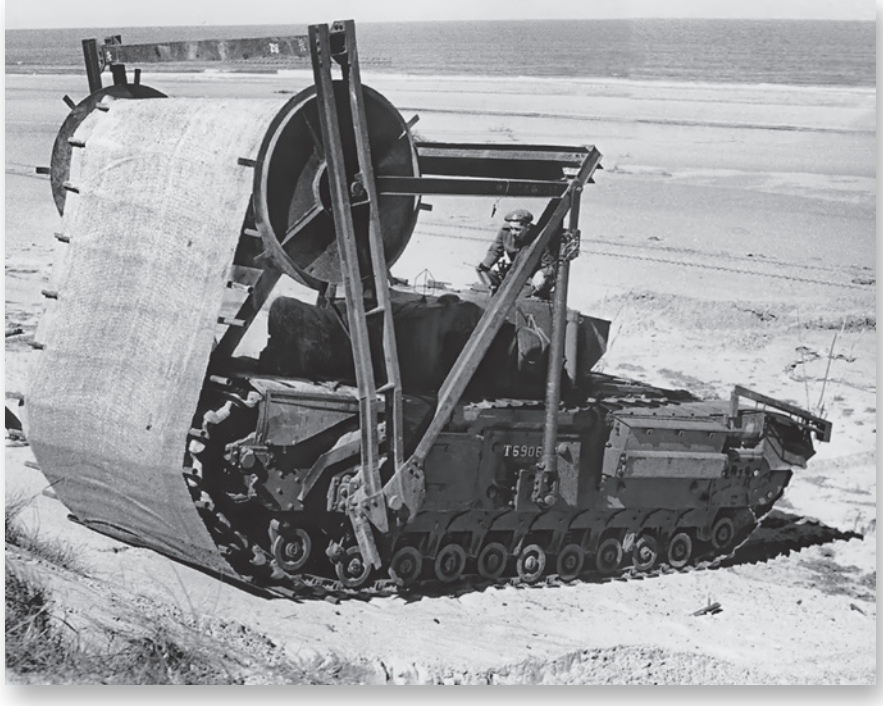

STEVEN J. ZALOGA ILLUSTRATED BY FELIPE RODRIGUEZ

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TANKS OF D-DAY 1944

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INTRODUCTION

The Operation *Overlord* amphibious landings in France in the summer of 1944 were spearheaded by tank landings. This book examines the specialized armor involved both in the *Neptune* landings in Normandy on June 6, and the *Dragoon* landings in southern France on August 15.

Lessons learned?

Allied forces had conducted numerous amphibious operations prior to Operation *Overlord*. Most of these occurred in the Mediterranean theater in 1942–44. Among the first landings involving the amphibious tanks was Operation *Torch* on November 8, 1942 against France's North African colonies of Morocco and Algeria. At the time, the Allies had limited naval capabilities for landing tanks, and the primary method was the use of LCM (Landing Craft Mechanized), which delivered small numbers of M5 light tanks fitted with "Blue Freeze" deep-wading kits.

The Operation *Husky* landings on Sicily in July 1943 once again saw the use of tanks with deep-wading kits delivered to shore from landing craft. As in the case of Operation *Torch*, the beaches were not heavily defended and the number of tanks landed in the initial waves was quite modest. The same was largely true for subsequent amphibious operations on the Italian mainland, including Operation *Avalanche* at Salerno in September 1943, and Operation *Shingle* against Anzio in January 1944. In all these cases, the delivery method was to use deep-wading kits on the tanks and deliver them by landing craft.

The outlier in all these landings was the Operation *Jubilee* raid against Dieppe on August 19, 1942. Although this raid was much smaller than the landings in the Mediterranean, the lessons from this failed attack had a profound impact on Allied planning for the use of tanks in Operation *Overlord*. Dieppe was seen as a more representative model for *Overlord* than the Mediterranean experiences, since it was a contested landing against German Atlantikwall defenses.

The Dieppe raid was both a tactical and technical disaster, exacerbated by abysmal planning and poor intelligence. The armored spearhead consisted of the 14th (King's Own Calgary) Canadian Army Tank Regiment landing 30 Churchill infantry tanks from Landing Craft Tanks (LCTs). The port of Dieppe was protected by German coastal artillery batteries on either side, as well

The heavy losses suffered during the ill-conceived Operation *Jubilee* raid on Dieppe on August 19, 1942 strongly influenced the *Overlord* plans regarding the use of tanks in an amphibious landing. This is a scene from the eastern side of the beach in front of the Dieppe casino with Churchill III "Bloody" of 10 Troop, 14th Canadian Army Tank Regiment in the foreground, "Buttercup" behind it, and tank landing craft TLC-5 (No. 121) in the left background.

as significant fortified defenses in the town itself. German gunfire managed to damage, disable, or sink all ten LCTs delivering the tanks to shore. The Churchills were fitted with deep-wading trunks. Two of the 29 tanks that attempted to land drowned in the surf; the rest reached shore. The planning had failed to consider the effect of chert rocks covering the beach, which immobilized about a dozen of the tanks. The three leading Churchills were fitted with a Beach Track-Laying Device that laid chespaling track over the 2ft-high seawall to provide additional traction. The seawalls in front of the town also proved to be a formidable barrier, and only 16 tanks managed to overcome both the chert and seawalls to advance into the town. By the end of the day, all 29 tanks were abandoned in Dieppe and many of their crews killed, wounded, or captured.

The technical lessons from Dieppe were many. Many planners felt that landing tanks directly on shore from LCTs was too dangerous for the LCTs. This led the program to develop amphibious tanks that could be launched from thousands of yards offshore and swim to the beach, thereby protecting the LCTs. Lt. Col. George Reeves, assistant director of the Department of Tank Development at the War Office, prepared a report a week after the Dieppe raid outlining the need for specialized tanks to deal with the obstacles and defenses. Over time, this was expanded to include flail tanks to clear mines, bridge-laying tanks to assist in overcoming beach obstacles such as seawalls and anti-tank ditches, and tanks capable of firing large, high-explosive charges to deal with walls and other obstructions.

From an operational perspective, the raid showed the hazards of conducting an amphibious landing against a defended port. Although it was not immediately apparent to Allied intelligence, the German Atlantikwall program placed an emphasis on defending ports, since it was presumed that port facilities would be an essential Allied requirement for logistical support. The areas between the ports were weakly defended. Since there were limited resources, some regions were more heavily fortified than others, notably the Pas-de-Calais. The essential reason that lower Normandy was selected for Operation *Neptune* was that its Atlantikwall defenses were especially weak, well into 1944.

SPECIALIZED TANKS FOR *OVERLORD*

The CDL Canal Defence Light Night-Fighting Tank

The CDL tank pre-dated *Overlord* planning but was one of the first specialized tanks considered for the *Overlord* landings. The CDL concept was to mount a powerful searchlight on a tank, with a massed formation of CDL tanks illuminating the battlefield and blinding the enemy. After mounting the CDL turret on various tanks including the Matilda infantry tank, Britain finally settled on using the M3 Grant/Lee medium tank, since it retained the 75mm hull gun. A total of 300 turrets were ordered.

In the autumn of 1942, the British Army demonstrated the CDL tank to Gen. Dwight D. Eisenhower and other senior US Army officers. In early 1943, the US Army decided to join the British program under the codename Project *Cassock*. From June 1943 to December 1943, 355 M3 medium tanks were converted into night-fighting tanks under the cover-names T10 Shop Tractors and Leaflet.

In the spring of 1943, the concept of using the CDL tanks for a pre-dawn amphibious landing was first tested during Exercise *Primrose* at Kilbride Bay in Scotland. The CDL tanks were carried on elevated ramps near the bow of LCTs to illuminate the shoreline and engage enemy defenses. The trials concluded that the CDL tank tactics were, "too uncertain to be depended upon as the main feature of an invasion." The CDL tanks remained under consideration for *Overlord* as late as June–July 1943, when the Combined Operations headquarters held the Rattle conference to discuss various tactics for *Overlord*. There were some reservations about the CDL tanks since the searchlights would attract the fire of enemy guns on the flanks of the blinding zone. In the event, the plans for *Overlord* shifted from a pre-dawn landing to a dawn landing, removing the need to use the CDL tanks.

The Sherman Duplex Drive Amphibious Tank

The tank most closely associated with Operation *Overlord* was the Duplex Drive (DD) amphibious tank. The DD tank was the brainchild of Hungarian-born designer Nicholas Straussler. He had examined various approaches to create an amphibious tank, and in 1940 came up with the idea of using a collapsible canvas skirt around a standard tank to provide enough buoyancy. This concept was first applied to a Tetrarch light tank in early 1941. This proved the basic concept but the prototype had too little freeboard and so was too prone to sinking. In September 1941, the British Tank Board approved the idea of a more refined Straussler design based around the Valentine infantry tank. This introduced a number of innovations including higher screens to accommodate the greater weight of the tank, as well as rigid supports to reinforce the pneumatic tubes that elevated the canvas screen. Propulsion in the water was provided by drawing power from the tank's engine to power a single propeller screw at the rear of the tank. The "Duplex Drive" name came from the fact that the tank was propelled by either its tracks while on land or a propeller when in the water. Tests of prototypes began in May 1942; production approval for 450 Valentine DD tanks was granted by the Ministry of Supply in July 1942 and began in March 1943.

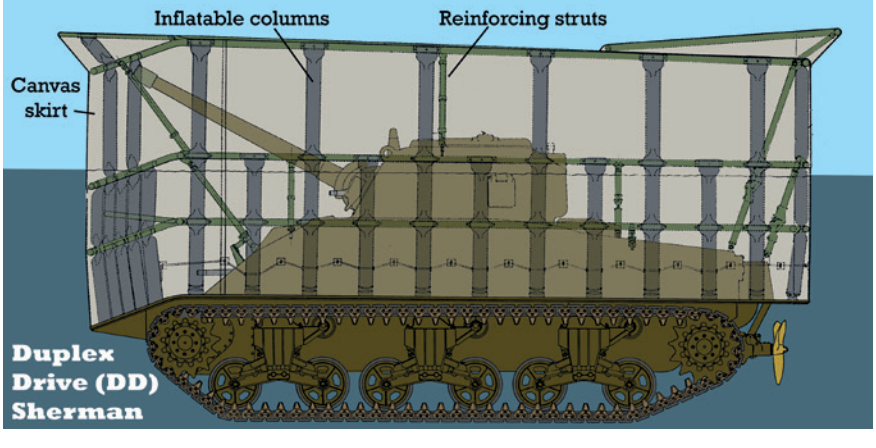
In April 1941, the US War Department began to study ways to land tanks ashore and learned about the early Straussler apparatus. On June 11, 1942, a formal project was begun as the M3E4 light amphibious tank. A prototype

The first DD tank produced in quantity was the Valentine DD. Although not used in combat on D-Day, it was extensively used in 1944 for training both British and American DD tank crews.

was completed by Studebaker Corporation in September 1942 and tested in Lake Michigan. The design was judged insufficiently robust, prone to sinking by enemy fire, and canceled in November 1942. Other alternatives were deemed more satisfactory, including the adaptation of the LVT-2 amphibious tractor into the LVT(A)1 amphibious tank by adding a light tank turret.

In the meantime, the Royal Armoured Corps (RAC) supported the development of a Sherman DD and work began in the spring of 1943. In July 1943, the British General Staff approved the conversion of 500 Shermans into DD tanks for *Overlord*; the requirement was later raised to 900 conversions. In April 1943, the UK Ministry of Supply tried to interest the US government in jointly producing the DD Sherman. US Army Ground Forces showed no interest owing to their previous experience with the M3E4. The Marine Corps felt that the Valentine DD was too slow and not seaworthy.

Chief of Staff to Supreme Allied Commander (COSSAC) informed US officers in Britain about the plans to use DD tanks for Operation *Neptune*. On October 8, 1943, the G-3 (Operations) office in the European Theater of



A cross-sectional illustration of an M4A1 DD tank showing the layout of its key components. This is in the final production configuration with the screen extension at the upper rear of the skirt. It does not show the improvised exhaust chimney added to the US Army tanks.

One of the M4A1 DD tanks transferred to the British Army in the spring of 1944. It is in the original configuration and lacks the rear screen extension. These tanks were used by the regiments of the 8th Armoured Brigade on D-Day.

Operations, US Army (ETOUSA) submitted a requisition order to Ordnance for the manufacture of 199 Sherman DD tanks for US units participating in Operation *Neptune*. This was sufficient for three battalions, each with four companies of DD tanks, plus training tanks. This stalled in Washington, since the DD Sherman tank was still under development and not ready for production. In view of the shortage of time, on November 1, 1943, Maj. Gen. Ray Barker, the deputy commander of COSSAC and the highest-ranking US Army officer on the combined staff, approached ETOUSA to accelerate procurement of DD tanks on an emergency basis. The issue was raised with the commander of the ETOUSA, Lt. Gen. Jacob Devers. Devers was particularly familiar with tank developments, having previously headed the Armored Force. Since neither Devers nor his staff had been briefed on the program, on November 17, 1943, they were given a demonstration of the DD tank.

Convinced of the need for the DD tank by the display, Devers dispatched a special courier by air to meet with Army Chief of Staff Gen. George C. Marshall to expedite procurement of the DD Sherman tank in time for Operation *Neptune*. Marshall immediately agreed to Devers' request, giving the DD project a Priority AAA rating, extremely unusual for a US tank program in World War II. Conversion of M4A1 medium tanks into DD tanks in the United States was hampered by the immaturity of the British design and the lack of adequate documentation. Dispatch of plans and critical parts was undertaken on an emergency basis from December 1943 to January 1944 by courier aircraft. The final plans did not arrive until January 22, 1944. A pilot tank conversion was completed by Firestone Tire & Rubber Co. on January 23, 1944, and sent for testing

The interim solution to the problem of crew asphyxiation due to exhaust fumes being trapped within the elevated skirts was to add an extra curtain across the engine deck behind the turret in an effort to trap the exhaust fumes to the rear. This is an example on an M4A1 DD tank from the 191st Tank Battalion on La Nartelle Beach northeast of Sainte-Maxime during Operation *Dragoon* on August 15, 1944.

the following day. The first ten American-assembled DD tanks arrived in the UK on March 10, 1944, less than three months after the production program was approved. This was a remarkable achievement, in large measure owing to Devers' advocacy and Marshall's firm support.

The British program began with the conversion of 293 Sherman III and 400 Sherman V into DD tanks by Metro-Cammell, but assembly was delayed until March 1944. Owing to the delay in starting the conversions, the British Army expected that there would be only 150 Sherman V DD tanks available at the beginning of May 1944. As a result, Valentine DD tanks would have to fill out the regiments. Gen. Bernard Montgomery approached ETOUSA in February 1944 to request the transfer of American assembled DD tanks to British/Canadian units. The US requirement was increased from 199 conversions to 350 with 80 M4A1 DD tanks allotted to the UK.

Deep-Wading Tanks

The development of deep-wading tanks pre-dated *Overlord*. As mentioned earlier, this technique was the preferred method for delivering tanks ashore during the North African and Mediterranean campaigns in 1942–44. Although the British and American programs proceeded independently, both armies cooperated in the development and exchanged technical ideas. The deep-wading kits used by British and American units during Operation *Neptune* on D-Day were locally manufactured and differed in detail. Deep-wading consisted of waterproofing the tanks as much as possible to prevent water from entering the hull, and adding deep-wading trunks to the air intakes, which would permit tanks to wade to shore from landing craft in

Crews of an M10 SPM of 3rd Anti-Tank Regiment RCA remove waterproofing from their vehicle on Mike Red Beach on Juno on D-Day. A Centaur of the 2nd RMASR can be seen in the right background. The deep-wading kits included two prominent trunks for the engine air intake and exhaust, as well as various canvas covers, tape, and other forms of waterproofing to permit the vehicles to wade ashore without flooding. One of the deep-wading trunks can be seen in the lower right foreground. (LAC PA-132898)

depths up to the top of the turret roof. These features were necessary, since on some beaches, the LCT could not dry-land the tanks directly on the shore due to the beach gradient.

Churchill AVRE

In the wake of the Dieppe raid, two Canadian officers, Lt. John J. Denovan of the Royal Canadian Engineers, and Capt. Schortinghuis of the 1 Canadian Mechanical Engineering Company of the Department of Tank Development (DTD) developed a scheme for an engineer tank to assist in amphibious

The "Bomb, Demolition Number 1," more popularly known known as the "flying dustbin," was a 290mm, 40lb projectile with a 23lb high-explosive content. It was projected from the Petard spigot mortar by igniting the propellant charge behind the projectile.

A

1. SHERMAN II (M4A1) DD TANK, C SQUADRON, NOTTINGHAMSHIRE YEOMANRY (SHERWOOD RANGERS), 8TH ARMOURED BRIGADE, GOLD BEACH

The 8th Armoured Brigade received its DD tanks from the American batches, as seen here. These arrived only in May 1944, so the usual British fittings such as the stowage boxes on the turret rear were absent from these tanks. There are still the remnants of a US Army registration number under the tactical number "26" on the turret, which would suggest that this tank is finished in US olive drab rather than its similar British counterpart, SCC 15. The numbering pattern for the regiment is not clear, since a photo of an A Squadron tank shows the tactical number 52, suggesting that the allotments did not fit the usual sequential pattern. The Nottinghamshire Yeomanry was the junior regiment in the brigade, hence the blue squadron marking. The tank name "Lily" is barely evident on the hull side.

2. SHERMAN V DD TANK, B SQUADRON, 13TH/18TH HUSSARS, 27TH ARMOURED BRIGADE, QUEEN RED SECTOR, SWORD BEACH

The 13th/18th Hussars used sequential numbers for its turret tactical numbers: 10–20 (HQ Squadron); 22–36 (A Squadron); 43–58 (B Squadron); and 66–80 (C Squadron). Since the census number would not be evident on the hull side, it was painted low on the turret side. The Allied Star insignia was painted on the turret roof (not visible here). On April 12, 1944, the British Army released directive ACI 533/44 that changed the basic camouflage color from the previous SCC 2 (Standard Camouflage Color) brown to US olive drab or its British equivalent, SCC 15 to avoid the need to repaint the numerous Lend-Lease tanks arriving in service.

1

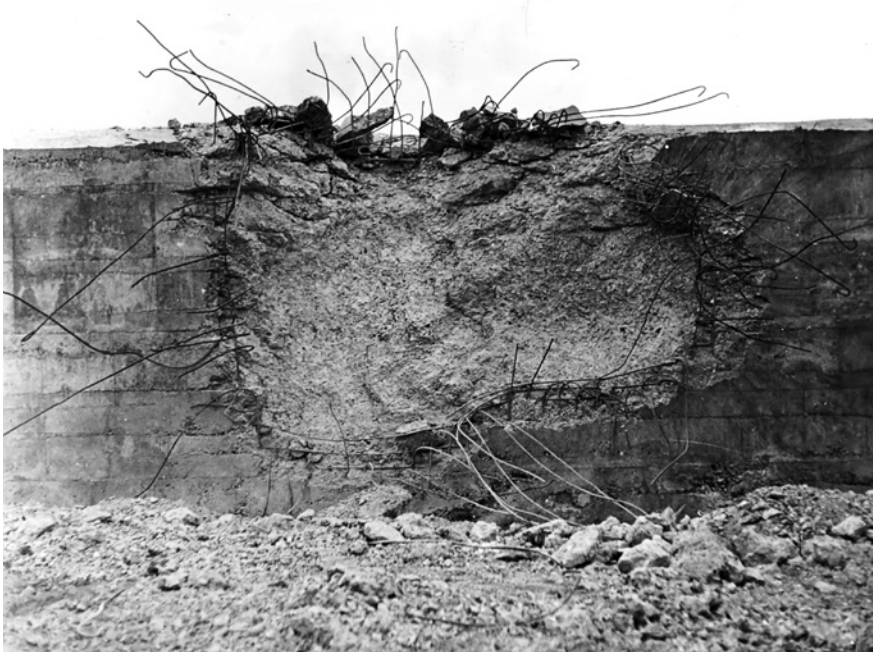
2

The Petard 290mm spigot mortar was the principal weapon of the Churchill AVRE. To load the device, the turret was turned over the co-driver/bow gunner's position on the left side of the hull, a special sliding door was opened, the loader released a catch to elevate the tube vertically, the projectile was fed into the barrel, and then the loader returned the barrel to the usual horizontal position. This process took about 35 seconds for a well-trained crewman, and the loader had his shoulders, arms, and head exposed during the process.

operations. The team was eventually provided a Churchill for the program since it was felt that the side doors and ample hull interior would be better suited to deploying engineer teams with demolitions than other alternatives such as the Sherman or Ram tanks. To assist in the demolition work, the Blacker Bombard was adapted to hurl a large demolition charge. This eventually emerged as the Petard, a 290mm spigot mortar that fired a 40lb projectile containing a 23lb high-explosive charge with a range of 80yds. This was intended for demolishing walls and similar obstructions.

The modified Churchill was eventually dubbed the Armoured Vehicle Royal Engineers (AVRE). An unarmed prototype of the design was completed in early 1943 and a second refined prototype was authorized by the War Office in February 1943. In May 1943, a full-scale conversion program was initiated with a requirement for 475 Churchill AVREs. About 180 had been completed by D-Day and 121 delivered.

Of the approximately 115 Churchill AVREs assigned to the assault waves on D-Day, all but 22 were fitted with some form of accessory for obstacle clearance or other engineer application. Of those without specialized devices, four were categorized as AVRE Command with additional radio fittings, and eight were classified as AVRE-GP (General Purpose), simply meaning that no devices were carried.



The Petard spigot mortar on the Churchill AVRE was primarily intended to demolish seawalls and German anti-tank walls along the beaches. This is the result of a test firing in Britain against a steel-reinforced concrete wall 10ft high. The Petard's blast warhead did not have enough penetrating power to go through such walls. Tests found that it took about eight minutes and a dozen "dustbin" rounds to create a sufficient opening in a German anti-tank wall for a tank to pass through.

This Churchill AVRE named "Avenger" of 1 Troop, No. 26th Squadron, 5th Assault Regiment RE landed on Mike Red, Yellow Gap (M2) on Juno Beach on D-Day, carrying a fascine. It accidently drove into a water-filled crater and four of its six crewmen were killed by German mortar fire while trying to escape. It was subsequently used to form a platform for a Small Box Girder (SBG) bridge laid by an AVRE of 2 Troop. The tank remained buried until November 1976, when it was recovered and restored. It currently carries the name "One Charlie" after its turret tactical number IC. It is currently located behind the beach in Graye-sur-Mer, a short distance south of the landing beach at Courseulles-sur-Mer. (Author)

AVRE Bridging Devices

Besides its use for demolition work, the Churchill AVRE was envisioned as the carrier for a variety of anti-obstacle accessories. The simplest of these was a large fascine, based on similar devices used by tanks in the Great War. These 6–8ft bundles of chespale or brushwood could be deposited into an anti-tank ditch to permit passage by tanks. These 4-ton loads were carried on the Churchill AVRE on a large frame on the front of the hull.

Several more elaborate devices followed in short order. The problem posed by seawalls common on the French coast was solved by various types of bridges. Several types were developed, of which the Small Box Girder (SBG) was the only type deployed on D-Day. This was 30ft long, could carry a load up to 40 tons, and could form a ramp up a seawall up to 12ft high.

The Churchill AVRE was used on D-Day to deliver the Small Box Girder (SBG) bridge. These were used primarily to provide a ramp over the seawalls. This particular photo shows one with the 79th Armoured Division in France later in the year.

There was considerable concern over the presence of barb wire obstacles on the Normandy beaches. A number of experimental remote breaching techniques were studied. Some AVREs were fitted to carry large Bangalore torpedo charges on the hull side that could be hand-emplaced by dismounted sappers.

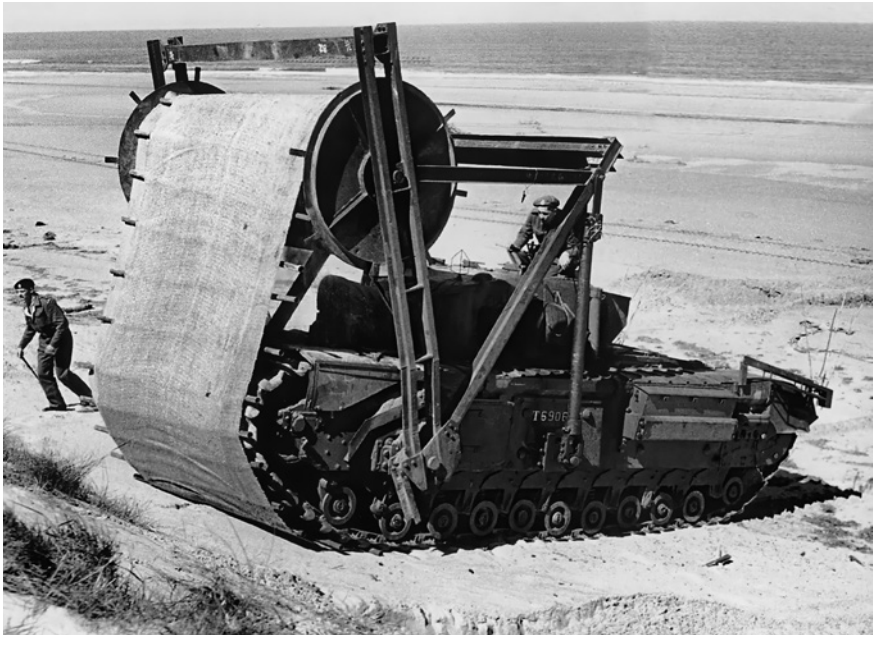
AVRE Carpet Layers

The problem with the chert encountered at Dieppe led to greater attention to beach conditions in Normandy. The invasion beaches selected for *Neptune* did not have chert layers, but did have sections covered with smaller shingle stones and areas of blue clay. Several different approaches were studied for this problem, of which three techniques were used on D-Day. The most common solution was a large bobbin of reinforced hessian fabric or steel shuttering that could be laid down over troublesome terrain, creating a type of road surface for subsequent tanks. The Carpet Layer Type B resembled the experimental device used by the Canadians at Dieppe, with two narrow bobbins to provide a surface for both tank tracks. This was eventually rejected in favor of a wide mat, the Carpet Layer Mk II (Type C). Two dozen of these accessories were fitted to Churchills on D-Day. They were the most widely distributed type of carpet device and used on all the British/Canadian beaches.

The Roly-Poly was a similar concept but these rolls were stowed at the front of LCTs. Once the LCT ramp dropped, they could either be deployed manually by a special crew or pushed out of the ramp by a Churchill AVRE, dubbed a "Pusher." The pusher modification consisted of a small frame on the bow of the Churchill, with a set of small wheels to prevent the Roly-Poly from interfering with the track. A dozen of these were deployed on D-Day on Gold Beach, using tube-coir Roly-Poly mats.

A variation on the bobbin was the Log Carpet. This consisted of 6–8in.-diameter timber connected with steel cable at 2ft intervals with an overall length of about 30yds. This was carried on a frame at the front of the AVRE and was deposited in front of the tank to create an artificial corduroy

The most common carpet-laying device used with the Churchill AVRE was the fascine, seen here on the left. A wooden rack on the glacis plate kept the fascine in place along with cables. These two Churchill AVREs are seen here while supporting Canadian units during Operation *Tractable* near Bretteville-le-Rabet, France, August 14, 1944. (LAC PA-116523)



The Churchill AVRE Carpet Layer Mk II (Type C) carried a large bobbin, usually of reinforced hessian fabric or steel shuttering that created a road surface over soft terrain or shingle. This example is testing reinforced hessian fabric.

road over soft terrain. Eleven of these were used on D-Day on Sword and Juno beaches.

Crab Flail Mine-Clearing Tank

The British Army had deployed the Scorpion mine flail tank in the North African campaign. The Scorpion flail required a separate engine to power the flail system and it was too wide for some LCT ramps. In 1943, a variety of alternatives were examined, finally settling on the Crab design. This was similar to the Scorpion but the flail was powered via the tank's engine. A prototype was completed in August 1943, and the design went through further testing. It was accepted for production later in the year, with a production requirement for 689 Sherman V Crab flail tank conversions. About 70 were deployed for Operation *Neptune* at the various British/Canadian beaches in the initial assault waves.

The Crab was not regarded as an ideal solution for beach mine clearing since detonation of mines in soft sand led to significant craters which in turn became obstacles for tanks. An alternative was the Bullshorn device, which was a type of mine rake that used prongs to create a lane through the minefield by pushing the mines to either side. Ten of these were assembled in time for Operation *Neptune* and mounted on Churchill AVREs, but only two were actually deployed in the initial assault waves on D-Day.

In 1943, the US Army built 41 copies of the Scorpion as the T3 mine exploder. The ETOUSA had expected the T3 Scorpion to be available for *Neptune*, but all were committed in the Italian theater in early 1944. Two new Sherman mine-clearing tanks entered production in January 1944, the T1E1 and T1E3 mine exploders. These were unsuitable for amphibious landings because of the high ground pressure of the massive steel rollers. The T1E1 added 18 tons to the weight of the tank while the T1E3 added 29 tons. The ETOUSA established a requirement for 25 Crab flail tanks for *Neptune* in early 1944, along with 40 Bullshorn mine ploughs. British industry was unable to produce sufficient mine-

clearing tanks in time for *Neptune*. By the end of June 1944, only 180 Crabs were in service with the 79th Armoured Division, with 45 more in reserve in the UK. Nine Crab flail tanks were eventually provided to the First US Army in mid-July 1944 after D-Day, but no Bullshorn ploughs were delivered.

Churchill Crocodile Flamethrower Tank

The British Petroleum Warfare Department had been developing armored flamethrower vehicles since early in the war. A Churchill with the Oke flamethrower was used in the Dieppe raid. The Churchill Crocodile, a substantially more powerful type, was developed beginning in late 1942 by using a special armored trailer to carry the 400 gallons of fuel and pressurized gas. The Crocodile was refined through early 1943 and production authorization granted in August 1943.

The prototype of the Churchill Crocodile flamethrower tank was first demonstrated to US Army observers on March 6, 1943. As a result of these demonstrations, the Chemical Warfare Officer-ETO requested that 100 Crocodile flamethrowers be obtained, but based on the Sherman tank rather than the Churchill tank. This requirement was submitted to the British War Office on August 11, 1943. The US Army was reluctant to adopt British tank accessories mounted on the Churchill tank since it involved the awkward deployment of small numbers of Churchill tanks with their own training and support requirements. A wooden mock-up of the Sherman Crocodile was completed on October 5, 1943 by the British Petroleum Warfare Department, followed by a working prototype in January 1944. It used the same trailer as the Churchill Crocodile, but had a different flame-gun arrangement on the right front corner of the hull. The first Sherman Crocodile was submitted for field trials on January 28, 1944. In the event, no Sherman Crocodiles were delivered to the US Army prior to D-Day. The War Office refused to forward the US Army order to the Ministry of Supply owing to lingering shortages of Churchill Crocodiles for the British Army at the time of Operation *Neptune*.

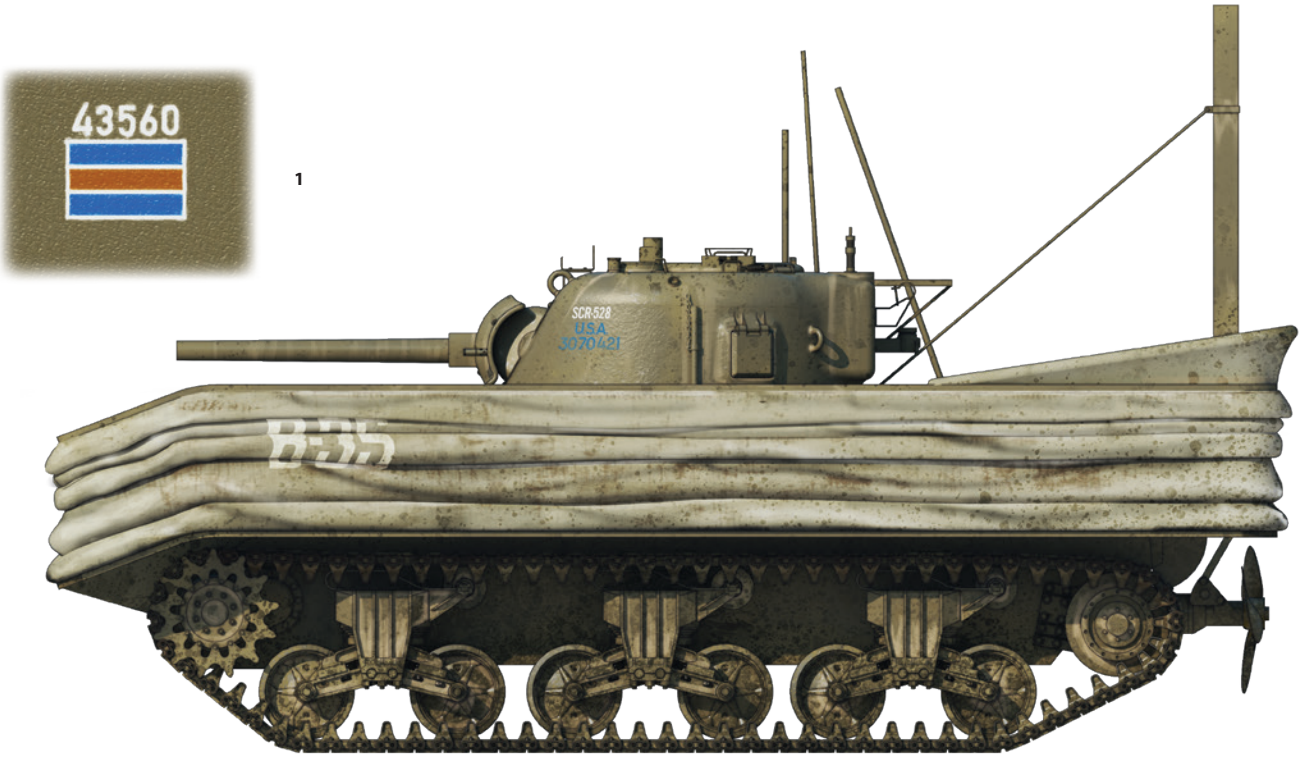
B

1. M4A1 DD TANK, CO. B, 741ST TANK BATTALION, OMAHA BEACH

This tank, tactical number B-4, was one of the five DD tanks that successfully landed on Omaha Beach, though it came to grief on the shingle later in the day. The tactical number was carried on the hull front immediately in front of the driver's hatch. The large "B-35" painted on the canvas skirt was not repeated on the right side. Its meaning is unclear but was probably a loading marking rather than a tactical number. On the turret is the tank registration number in blue drab; the actual number is unclear in photos and the number here is representative. Above it in white is the stenciled "SCR-528," referring to the radio fitted to the tank. The inset illustration shows the company's Preparation for Overseas Movement (POM-ETO), a color-coded symbol used during transport. These were about 9in. wide and were generally painted on the front and rear of each vehicle. Each company received a five-digit unit serial number, and the top and bottom colored bars corresponded to the penultimate number while the center bar corresponded to the last number. The number color assignments were: 1 (buff); 2 (olive drab); 3 (yellow); 4 (green); 5 (grey); 6 (blue); 7 (maroon); 8 (red); 9 (white); 0 (brown). The British Army used a similar system, but the assigned colors/number pattern was different.

2. M4A1 DD TANK, CO. A, 70TH TANK BATTALION, UTAH BEACH

Tanks of the 70th Tank Battalion had the unit mascot, a turtle named "Joe Peckerwood," painted on their tanks, in this case on the turret side. This design was created by Lt. Gilbert McMurtrie of the HQ Company. This tank was named "Available Jones," a character from the popular *Li'l Abner* comic strip. On DD tanks, the registration number was repainted on the turret front since it was not visible otherwise when the skirt was fitted. The 70th Tank Battalion often painted the tactical number in red with a white outline on the rear of the Sherman turret, as seen here.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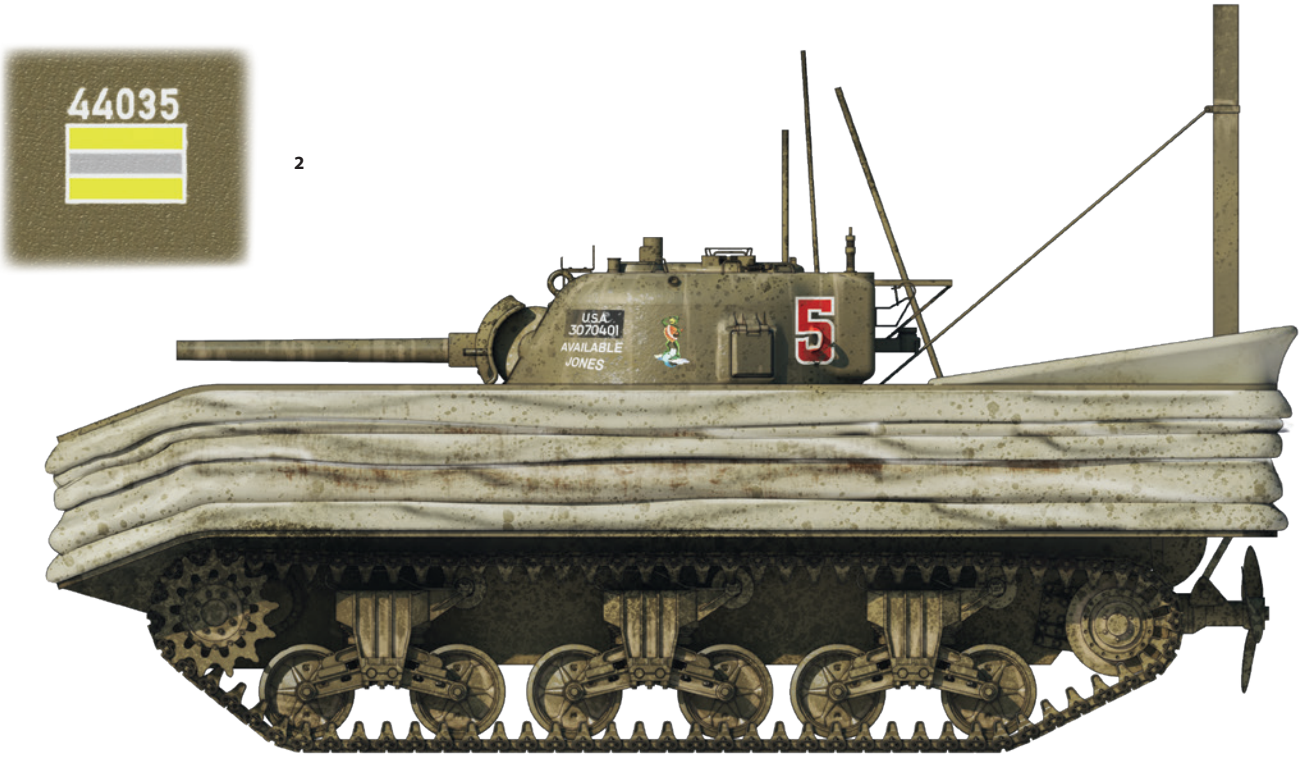
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5

The British Army had an immediate requirement for 176 Crocodiles, of which only 70 were delivered by June 1, 1944. In the event, only six were deployed in the initial assault waves on D-Day, with two troops of C Squadron, 141 RAC on Gold Beach.

T1 Armored Engineer Vehicle

The US Army equivalent of the AVRE was the Armored Engineer Vehicle (AEV), a derivative of the M4A3 medium tank. This was clearly inspired by the Churchill AVRE based on US Army inspections of the prototype AVREs in early 1943. The T1 AEV mimicked the Churchill AVRE with the addition of doors on the hull side to permit engineers to dismount from the vehicle and to facilitate access to engineer demolition charges and other tools stowed inside the vehicle. ETOUSA discouraged the use of the Petard after witnessing early demonstrations. The Petard had to be reloaded externally by the co-driver, who was partially exposed to enemy fire during the 35-second process. Beyond this, the Petard had an effective range of only 80yds and its explosive content was only as much as a standard engineer satchel charge.

The preferred alternative for the AEV was the T40 Whizbang demolition rocket launcher containing 20 7.2in. demolition rockets, with an effective range of about 230yds, about four times that of the Petard. The launcher was armored, offering protection from heavy machine-gun fire. The main impediment to the development of the AEV was the lack of an enthusiastic sponsor. The engineer officers evaluating the AEV in early 1944 suggested that, "consideration be given to the forming of special Engineer units to exploit the apparently excellent possibilities of this multi-purpose weapon," and they cited the Royal Engineers of the 1st Assault Brigade RE as an example. Brig. Gen. Ludson Worsham, head of the War Plans Division of the Office of the Chief Engineer, retorted that, "I can't see forming a new organization to fit a particular vehicle." As a result, no AEVs were available for *Overlord* and indeed there was no serial production during the war.

As a result, the ETOUSA decided to develop an improvised alternative. The T40 Whizbang launcher was already available in the UK for potential use as a fire support weapon from the LCT(A). This could be fitted to ordinary M4 medium tanks. To provide a more versatile vehicle, ETOUSA planned to fit them to M4 tanks already mounting the M1 tank-dozer,

C

1. M4A1 MEDIUM TANK, CO. A, 741ST TANK BATTALION, OMAHA BEACH

Company A landed from LCT(A) at H-5 around the same time as the handful of surviving M4A1 DD tanks reached shore. The tank names usually started with the company letter, so "Adeline II," "Aide-de-Camp," etc. The other markings included the usual registration number on the hull rear, and the Allied Star on the turret roof. These tanks towed an M8 armored ammunition trailer behind them off the LCT(A), but the registration number associated with this combination is not certain.

2. M4 TANK-DOZER, DEMOLITION TEAM 7, 70TH TANK BATTALION, UTAH BEACH

A total of eight tank-dozers were assigned to the Utah landings, with four from the 70th Tank Battalion and four from the 612th Engineer Light Equipment Company. Each of these supported one of the eight Army Demolition Teams. "Double Trouble" was assigned to Demolition Team #7, hence the DT-7 marking on the hull side. The US flag insignia shown at the right was a 9in. sticker provided to each vehicle that was usually attached immediately in front of the driver's hatch. As vehicles were inspected prior to loading on their assigned craft, a box was crossed off on the form below the flag. These tank-dozers were originally scheduled to receive T40 demolition rocket launchers, and the fittings including the turret trunnion mount and the gunner's vane sight were left on the tanks even though it was decided against using the rocket launchers.

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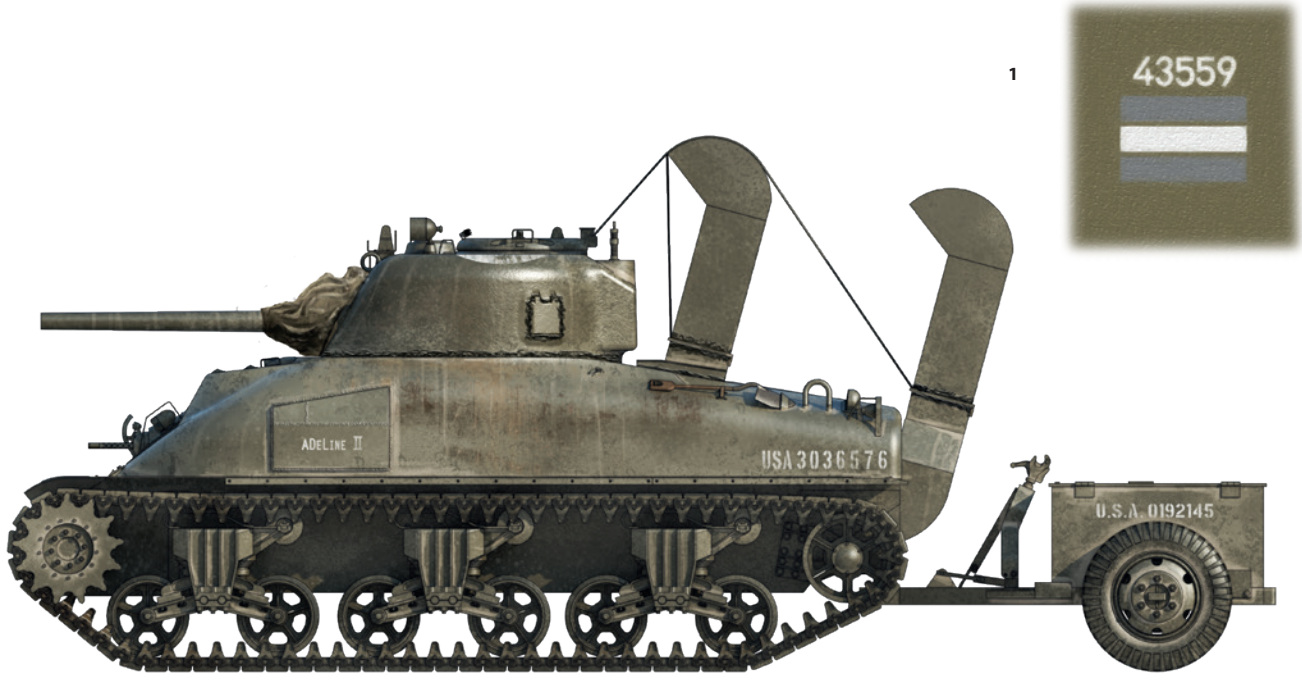
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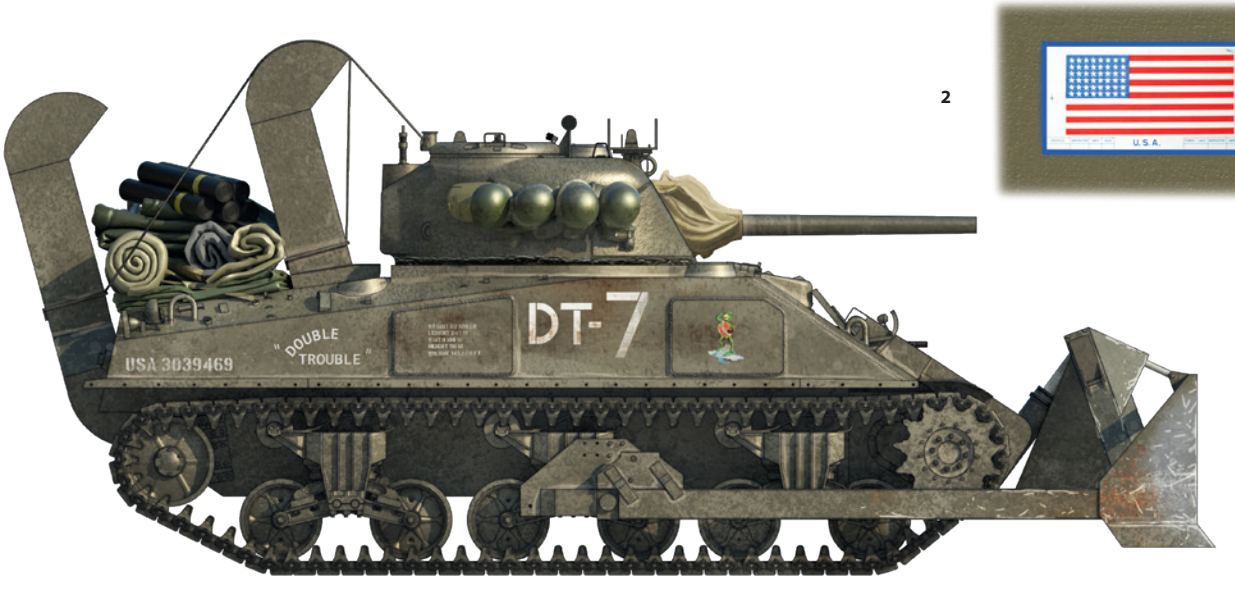
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creating the equivalent of an AEV without the side doors or internal engineer stowage.

The 70th Tank Battalion, earmarked to support the 4th Infantry Division on Utah Beach, was assigned to test the launchers during exercises at the Assault Training Center in North Devon. The test was conducted on May 8, 1944 and was a disappointment. The target was a concrete wall imitating German anti-tank walls. Several rockets were duds and the others only scabbed concrete from the wall. The tank crews were very dismayed by the configuration of the launcher, since it was positioned only inches over the turret roof, making escape through the turret hatches nearly impossible. The battalion commander, Lt. Col. John Welborn, ordered his tank crews to engage the target wall using high-explosive ammunition from their 75mm tank guns. This did more damage than the rockets. At the end of the exercise, the consensus was that the T40 demolition rocket launcher was not effective enough, and potentially hazardous to the crew and landing craft. As a result, no tanks were landed on D-Day with this device.

M1 Tank-Dozer

In February 1944, German engineers began creating obstacle belts on potential landing beaches, starting on the Pas-de-Calais. The obstacles began to appear on the *Neptune* beaches in late March 1944.The US Army Engineer Board had begun to study possible solutions to the obstacle problem in March 1943, concluding that a tank-mounted dozer blade was the most suitable solution. Pilots of the tank-dozers were shipped to Fort Pierce for trials against obstacles in the summer of 1943. On March 5, 1944, the Army standardized the LaPlant-Choate dozer as the Medium Tank-dozer M1 and authorized the production of 500 kits. The US Army regarded these as more versatile than the AVRE/AEV for Operation *Neptune*, since they could be adapted to many functions, including breaching anti-tank ditches and other obstacles. Production began on April 10, 1944 at a planned rate of 40 per week.

The British Army also came to regard tank-dozers as the best solution to the new German obstacle threat. On March 4, 1944, Gen. Montgomery dispatched a request to the War Office to obtain Sherman tank-dozers from the US. “Fresh obstacles have appeared on the *Overlord* beaches. They will probably necessitate the extensive use of bulldozers at an early stage in the assault. The armored bulldozer now available to British forces cannot be armored sufficiently to perform this function satisfactorily. The best equipment known to exist for this purpose is the Sherman Bulldozer, now in production in the USA.” Two days later, the War Office categorized the issue as an emergency since, “the Sherman bulldozer is [the] only – repeat – only existing equipment that will meet this requirement.” A letter from the War Office to COSSAC chief Lt. Gen. F. E. Morgan, on March 8 noted that a supply of Sherman bulldozers, “may have a most important if not decisive effect upon *Overlord*.” Eisenhower’s headquarters endorsed the British request on March 20, 1944.

A total of 70 tank-dozers were allotted to ETOUSA from the initial 1944 production batches; they began to trickle in during April 1944. First US Army deployments of tank-dozers were modest owing to the small number that arrived in Britain prior to the D-Day landings. A total of 16 dozers were deployed at Omaha Beach and eight at Utah Beach. In the end, the British received no M1 tank-dozers for D-Day. They used armored D7 bulldozers

instead. The AVREs were often used in an improvised fashion, either pushing the obstacles aside or towing them away using cables.

US Army acquisition of Armoured Funnies

On January 26, 1944, the newly appointed Supreme Commander Allied Expeditionary Forces (SHAEF) commander Gen. Dwight D. Eisenhower, accompanied by Chief of the Imperial General Staff Field Marshal Alan Brooke, 21st Army Group commander Gen. Bernard Montgomery, and First US Army commander Lt. Gen. Omar Bradley, visited Hobart's 79th Armoured Division training area in Orford to witness a demonstration of Armoured Funnies. Eisenhower, new to the debate over specialized armor, responded enthusiastically to Hobart's demonstration. "We'll take everything you can give us." Bradley, aware of the previous debates, was non-committal and remarked that he would have to consult his staff.

As a result of this demonstration, a board was established by First US Army to examine requirements for the British specialized tanks, chaired by Col. John Medaris, FUSA Chief of Ordnance. On February 2, 1944, the board recommended adopting certain of the British equipment, beyond that already ordered in 1943 as mentioned above, including the DD tank and Sherman Crocodile. On February 16, 1944, Montgomery's 21st Army Group headquarters attempted to facilitate the process by dispatching a report to the War Office, outlining US Army requirements for British devices in connection with Operation *Overlord* as summarized below. None of this equipment was delivered to FUSA prior to D-Day, since British industry was unable to satisfy existing British Army orders and several of the devices did not reach the production stage.

Device	Number required
Crab (flail tank)	25
Bullshorn ploughs (mounted on Sherman tank for mine clearing)	40
OAC Mk III ploughs (mounted on Sherman tank for mine clearing)	40
Harrows (for mine clearing)	50
Centipedes	50
Crocodile Sherman	100 sets + 25 spare trailers
AVRE (Churchill)	0
Ark (Churchill bridge layer)	0
SBG Mk II (Churchill with Small Box Girder bridge)	0
Bridge layers (other Churchill types)	0
Special charges	0
Snakes (explosive charges)	0

TANKS, DOCTRINE, AND ORGANIZATION

The level of tank support was very similar on all five *Neptune* beaches but there was much more extensive armored engineer support on the British/Canadian beaches. The British/Canadian beaches assigned one armored regiment per infantry brigade group. Each armored brigade had two squadrons with about 40 DD tanks to spearhead the landings ahead of the lead infantry waves. A third squadron with deep-wading trunks

BELOW
The 3rd Infantry Division's 20th Anti-tank Regiment RA generally deployed a battery of M10 SPM tank destroyers to each infantry brigade group during the landings, and two batteries with the spearhead 8th Infantry Brigade Group. Here one is providing covering fire for troops of the 2nd East Yorkshire. They were instrumental in breaking up the Panzer counter-attack from the 21st Panzer-Division later on D-Day.

followed in later waves, 45 minutes to an hour after the initial assault wave at H-Hour.

Likewise, the US Army deployed a tank battalion per regimental combat team (RCT). The original plan in 1943 was to equip all four companies with DD tanks, for a total of about 64 DD tanks per battalion. During initial planning discussions in December 1943 between the V Corps commander, Maj. Gen. Leonard Gerow and the new First US Army commander, Lt. Gen. Omar Bradley, Gerow expressed considerable doubt about the viability of the DD tanks and indicated that he preferred to use deep-wading tanks, which had a proven record in the Mediterranean theater. Since there were not enough LCTs to deliver four companies per RCT, Gerow suggested that light tanks, preferably the new M7 light tank, could be landed from LCMs. This was ruled out since M7 light-tank production had been canceled. Furthermore, Allied naval leaders did not want to employ the small LCM, both due to its dubious durability in the Channel as well as the traffic congestion that would result from large numbers of small craft. The method of deploying tanks from LCM in the Pacific, by basing them on LSDs, was not possible for *Neptune* because of a lack of LSDs.

As a result of Gerow's objections, Bradley consented to the use of two companies of DD tanks per battalion swimming ashore from LCT-6, and one company of deep-wading tanks landing directly on the beach from LCT(A). The LCT(A) were LCT-5 that were modified in British shipyards with armor protection for the bridge and other vital areas to permit them to land directly on the shore in

the face of enemy machine-gun fire. As a result, the US regimental combat teams in the first wave were supported by 48 tanks (32 DD tanks + 16 deep-wading M4 medium tanks).

After the first wave of supporting tank regiments/brigades, the British/Canadian beaches had another armored regiment, fitted with deep-wading equipment, assigned as a reserve. Likewise, the US Army had additional tank battalions in reserve that were landed as required.

Gunfire support groups

One of the more obscure aspects of Allied tank support on D-Day was the use of tanks from LCT(A)s to conduct fire support during the approach to the beaches. These were called Gunfire Support Groups. The idea was to provide some direct fire support from the time when the naval bombardment lifted to the time when the first tanks reached shore. This concept was pioneered by the Royal Marines Armoured Support Group (RMASG) that was equipped with the Centaur IV tank armed with a 95mm howitzer. A pair of Centaurs were deployed on a special ramp that would allow them to fire against targets on the beaches during the approach to shore. Additional ammunition was stowed in the ramp below the tanks so that they would not exhaust their onboard supply during this initial fire support mission. Loaders were assigned to each ramp to help hoist the extra ammunition to the tank crews. These Royal Marine units were deployed on a scale of one battery per infantry brigade group with three to four troops.

Another twist on this concept was to deploy Sherman 17-pdrs as "Concrete Busters" to attack specific German bunkers. As in the case of the Centaurs, two Sherman 17-pdrs were mounted on a special ramp on the LCT(A)-CB. These were deployed on a scale of one pair of Sherman 17-pdrs per RMASG battery, but these tanks were crewed by normal RAC crew, not Royal Marines.

The US Army followed suit with their companies of deep-wading tanks. Two M4/M4A1 medium tanks were deployed on a timber ramp to fire at

OPPOSITE
On D-day, tanks were delivered to the beaches on various types of Landing Craft Tank (LCT). On the US beaches, the DD tanks were delivered by LCT-6, as seen on the left. The deep-wading tanks and tank-dozers were delivered on the LCT(A), a modified version of the LCT-5, as seen on the right.

The Gunfire Support Groups placed two Sherman tanks on ramps at the front of the LCT(A) to provide fire support during the run-in to the beach. This is LCT(A)2273 of Assault Group O-2 carrying two M4 medium tanks of Co. A, 743rd Tank Battalion and M4 tank-dozer No. 2 supporting Army Engineer Gap Team 2. Six of the dozers in this sector were manned by the 743rd Tank Battalion, the other two by the 610th Engineer Light Equipment Company. The craft was damaged the previous evening and arrived off Dog Green sector, Omaha Beach late on D-Day morning. It successfully landed its tanks but was badly damaged and had to be beached.

shore targets during the approach to the beach. Owing to the 50 tons of weight added to the LCT(A), only one more tank could be carried. Since the third tank could not fire over the bow, the US Army attempted to augment the firepower of the LCT(A) by adding a multiple rocket launcher to the third tank. Both the 4.5in. T34 Calliope rocket launcher and 7.2in. T40 Whizbang demolition rocket launcher were tested for this role but the scheme was abandoned, probably due to the effects of the rocket exhaust against the bridge. As mentioned earlier, the appearance of increasing numbers of German beach obstacles led to the addition of tank-dozers to the initial landing plans. These were carried as the third tank on each LCT(A) behind the two medium tanks on the firing ramps.

The tanks of the Gunfire Support Groups were expected to begin firing against the beach at a range of 3,000yds at H-15, with an allotment of 150 rounds per tank, stowed under the elevated ramp.

Armored engineer support

Beyond the tank support, each of the British/Canadian infantry brigade groups had armored engineer support from the 79th Armoured Division. Each of the three landing beaches received a composite breaching team consisting of a squadron of Crabs and two AVRE squadrons. On Juno and Gold, these teams were divided in half with each of the two leading infantry brigade groups receiving a breaching squadron of one troop of Crabs and two troops of AVREs. On average, each infantry brigade group had about 24 Churchill AVRE and 13 Crab flails. Since only a single infantry brigade group landed in the initial wave on Sword, this composite team was larger, with two squadrons of Crabs and two squadrons of AVREs.

About 115 AVREs were assigned to *Neptune*, including 24 bobbins, 24 fascines, 20 SBG bridges, 18 general-purpose, 12 Pusher/Roly-Poly, 11 Log Carpets, four Command, and two Bullshorn plows. The Westminster Dragoons deployed portions of two squadrons with about 25 Crabs; the 22nd Dragoons deployed three squadrons with about 46 Crabs.

These elements of the 79th Armoured Division generally were landed from the LCT Mk IV (six tanks) or the smaller LVT Mk V (four tanks). The deployment sequence depended on the terrain features. In many cases, AVREs with carpet-laying devices landed first to create a firm footing, and then the Crab flail tanks followed to conduct mine clearing in front of the remaining Churchill AVREs equipped with bridges or fascines. These Royal Engineer teams were expected to clear lanes up the beaches, and then to assist the armored regiments in advancing through the towns to the initial objectives away from the beaches. A portion of the AVREs remained on the beaches to assist in removing obstacles.

Each of the infantry brigade groups also had two self-propelled anti-tank batteries assigned, totaling eight M10 SPM. These generally landed in the later waves, not with the spearhead forces at H-Hour.

In comparison, the US Army regimental combat groups had very little armored engineer support. This was in part due to foot-dragging by the US Army Corps of Engineers to develop specialized armored engineer equipment, and in part due to the British inability to supply any Armoured Funnies owing to their own shortages. A single tank-dozer was assigned to each dismounted engineer gap-breaching team, so there were 16 tank-dozers on Omaha Beach and eight on Utah Beach.

SWORD BEACH

8th Infantry Brigade Group

13th/18th Hussars

5th Royal Marines Ind. Armoured Support Battery

45 & 67 AT Batteries RA

77 & 79 Assault Squadrons, 5th Assault Regiment RE

A & C Squadron, 22nd Dragoons

Armored Reserve

Staffordshire Yeomanry

JUNO BEACH

7th Canadian Infantry Brigade Group

6th Canadian Armoured Regiment (1st Hussars)

3 Battery, 2nd Royal Marines Armoured Support Regiment

248 Battery, 62nd AT Regiment RA

26 Squadron, 5th Assault Regiment RE

2 & 3 Troop, B Squadron, 22nd Dragoons

8th Canadian Infantry Brigade

10th Canadian Armoured Regiment (Fort Garry Horse)

4 Battery, 2nd Royal Marines Armoured Support Regiment

105 Battery, 3rd AT Regiment RCA

80th Assault Squadron RE

1 & 4 Troop, B Squadron, 22nd Dragoons

Armored Reserve

Sherbrooke Fusiliers

GOLD BEACH

69th Infantry Brigade Group

4th/7th Royal Dragoon Guards

Troop, C Squadron, 141st RAC

2 Battery, 1st Royal Marines Armoured Support Regiment

99 Battery, 102nd Northumberland Hussars AT Regiment RA

81 Squadron, 6th Assault Regiment RE

C Squadron, Westminster Dragoons

231st Infantry Brigade Group

Nottinghamshire Yeomanry

Troop, C Squadron, 141st RAC

1 Battery, 1st Royal Marines Armoured Support Regiment

288 Battery, 102nd Northumberland Hussars AT Regiment RA

82nd Assault Squadron, 6th Assault Regiment RE

B Squadron, Westminster Dragoons

OMAHA BEACH

16th Regimental Combat Team

741st Tank Battalion

116th Regimental Combat Team

743rd Tank Battalion

Armored Reserve

745th Tank Battalion

747th Tank Battalion

UTAH BEACH

8th Regimental Combat Team

70th Tank Battalion

Armored Reserve

746th Tank Battalion

THE CAMPAIGN

Operation *Neptune* was scheduled to begin at approximately half tide of a rising tide. Since the timing of this varied from beach to beach, H-Hour correspondingly differed. This time was selected to allow the landing craft to land on the seaward side of the German obstacle belts. Engineer/sapper teams accompanied the lead waves of infantry and tanks to create gaps through these obstacle belts for succeeding waves of landing craft that arrived as the tide began to cover the obstacles.

Sword Beach

The British 3rd Infantry Division assault on Sword Beach was conducted by only a single infantry brigade group because of the beach topography.

This Centaur tank landed at Sword Beach between Hermanville and Lion-sur-Mer with the 5th Royal Marines Ind. Armoured Support Battery. It was recovered in 1975 near Hermanville and put on display in June 1977 opposite Café Gondrée in Bénouville on the west bank of the Caen Canal near Pegasus Bridge. It underwent a full restoration in 2014 and was moved to the Pegasus Bridge Memorial Museum.

The rough sea conditions on D-Day led to the decision to launch the DD tanks from about 5,000yds from shore instead of the planned 7,000yds. One LCT was delayed when the lead DD damaged its screen and it arrived 45 minutes late after the LCT sailed directly to the beach.

German anti-tank guns took a toll on the disembarking tanks. Nearly a fifth of the LCTs were damaged during the landings. A Crab from 3 Troop, 22nd Dragoons was hit by 75mm fire three times before it cleared the surf. A 22nd Dragoon history later recalled that, "this was fierce shooting at close range; like so much of the fighting on this beach, tanks ran for gun emplacements in a grim race to put their shells almost point-blank through the mouths of the concrete boxes before they themselves were put out of action." On LCT-947, the first Crab exited to the beach, but as the second Crab – with 5th Assault Regiment commander Lt Col. Arthur Cocks aboard – exited, a volley of German anti-tank rounds struck the tank and the bow area, with the damaged Crab thus blocking the ramp. The Bangalore torpedoes on the following Churchill AVRE/Log Carpet were detonated, possibly by a mortar round, killing Cocks and two other tankers, and injuring several others.

C Squadron, 13th/18th Hussars landed at H+45 from LCTs and was committed to the struggle against the German WN17 "Hillman" defensive strongpoint. The armored reserve for Sword, the Staffordshire Yeomanry,

D

1. CHURCHILL AVRE WITH SBG, 2 TROOP, 77 ASSAULT SQUADRON, 5TH ASSAULT REGIMENT, QUEEN WHITE–YELLOW GAP, SWORD BEACH

This Churchill AVRE has the usual style of tactical marking 2B on the turret edged in white. It is not known if this marking was repeated on the wading trunks, as was the case with other squadrons. The tactical numbers generally began with the troop number. There is some dispute about the letter suffix, with suggestions that the different letters indicated different accessories such as fascines (A), SBG bridge (B), bobbin (C). It seems more likely that the letter was assigned on the basis of the loading plan on the LCT, so that "A" tanks typically were fitted with some type of carpet device or served as pushers for Roly-Poly. The SBG bridges used on D-Day appear to have been painted white, presumably for visibility. As mentioned previously, the standard camouflage color for British AFVs switched in April 1944 from SCC 2 brown to SCC 15 olive drab. The directive noted that there was no need to repaint existing vehicles finished in SCC 2, so it is impossible to tell from black and white photos if the tanks are SCC 2 or SCC 15.

2. CHURCHILL AVRE WITH LOG CARPET, 3 TROOP, 79 ASSAULT SQUADRON, 5TH ASSAULT REGIMENT, QUEEN RED–BLUE GAP, SWORD BEACH

This AVRE (T 172053/C), named "Cheetah," tactical number 3A was commanded by troop leader Lieutenant William H. H. Hutchinson and landed from LCT(4) Serial 115. When carrying the Log Carpet, the AVRE had its turret traversed to the eight o'clock to nine o'clock position. The skids for the Log Carpet on this AVRE were the tubular metal style rather than the wood skids prescribed in the 79th Armoured Division instructions. The Log Carpet was created by taking 20 logs of about 6in. diameter and 11' 6" length, and drilling holes in them about 1' 3" from either end. Steel wire rope was then laced through the holes, with the logs spaced about 2ft apart, except for the first log, which was placed 6ft from the remainder of the carpet. The first log was mounted at the top of a pair of tubular steel braces and held in place with cordage. A length of cordage was then run from the first log through the right pistol port, and held in place inside by tying it to a pick handle. The crew could then release the first log by releasing the cordage that held the first log in place. At this point, the tank would begin driving over the first log, with the succeeding Log Carpet dragged under the tracks.

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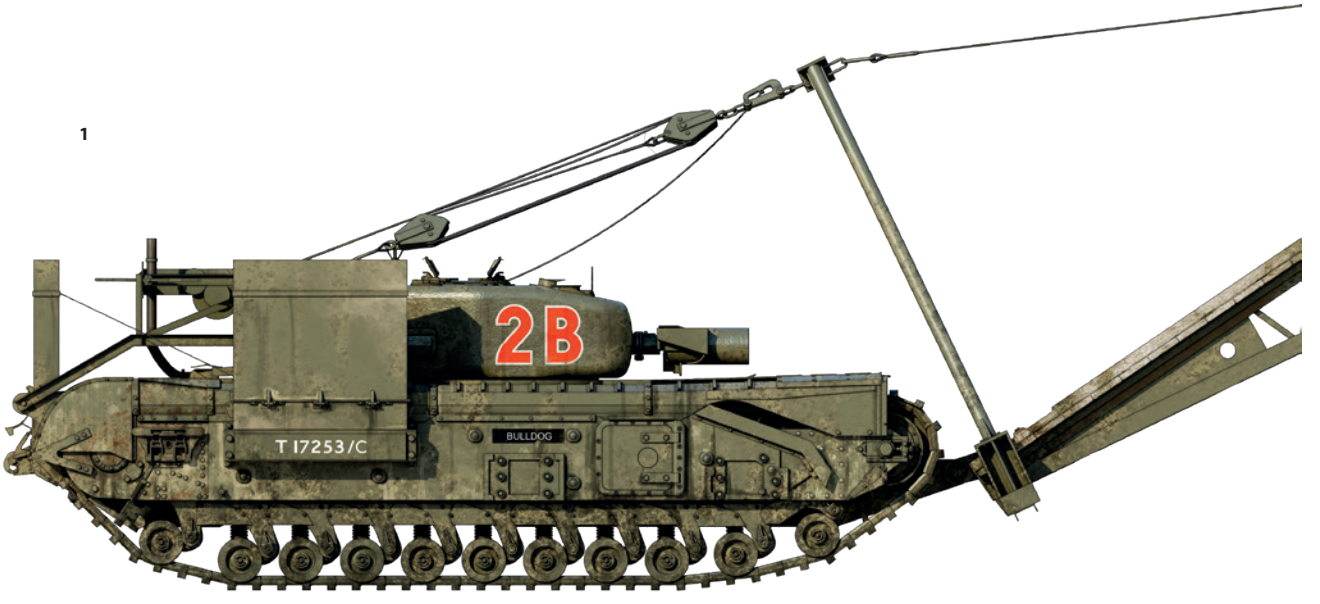

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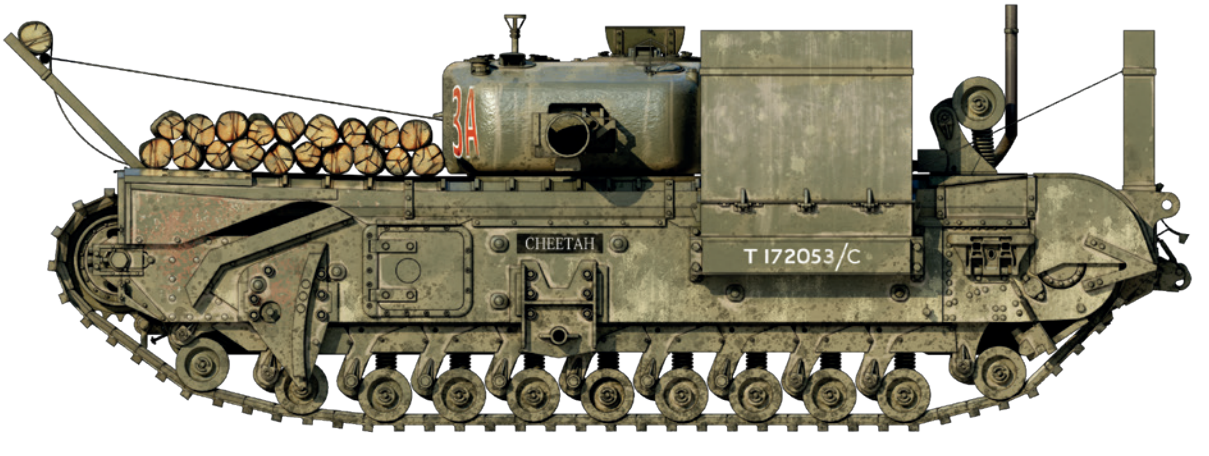

A Sherman V DD tank of the 13th/18th Hussars with its skirt crumpled that was swamped before reaching Sword Beach on D-Day.

landed at 1030hrs, by which time most of the German defenses on the beach had been suppressed. These tanks were involved in one of the few tank vs. tank engagements of D-Day, when Kampfgruppe Oppeln of the 21.Panzer-Division, including elements of Panzer-Regt.22, ran into the elements of the Staffordshire Yeomanry and M10 SPMs of one of the anti-tank batteries. In a series of fierce skirmishes, the Germans lost 13 PzKpfw IVs without inflicting any tank losses on the British.

Armored casualities on Sword were among the highest of any of the British beaches. Of the 38 DD tanks of the 13th/18th Hussars, 32 were launched, and three sank – two of these run over by LCTs. Of the 29 reaching shore, 11 were swamped in the surf, and ten were knocked out, with casualties amounting to more than half the force. Including the wading tanks, the 13th/18th Hussars lost 31 of 61 tanks. The surf conditions on the beach were severe, in part due to the fast, incoming tide. Of the 14 tanks of the Royal Marines battery, four were drowned in the surf after discharge from their LCT(A); three others were not delivered until D+1. Of the 30 Churchill AVREs of 5th Assault Regiment RE, five were knocked out and five damaged, about a third of the force. Of the 26 Crab flail tanks of the 22nd Dragoons, six were knocked out and four damaged, about two-fifths of the force. The Staffordshire Yeomanry lost five tanks during the day's fighting.

Tank support on Sword was vital in suppressing the German defenses. However, clearing gaps in the obstacle belt was partially accomplished with two gaps not cleared and the remaining six cleared late. The beach became congested with men and vehicles, slowing the process of pushing the subsequent brigades beyond the beach. Plans to seize Caen by the 185th Brigade with support from the 27th Armoured Brigade was frustrated by the friction of war more than any specific German counter-action.

Medics attend the wounded sheltering beside a Churchill AVRE Log Carpet layer named "Cheetah" AVRE T 172053/C of 79th Assault Squadron RE, which landed from LCT(4) Serial 115 on Queen Red–Blue Gap. The three tubular lengths associated with the Log Carpet are evident on the top of the front mudguards after the carpet was dispensed. This was probably tank 3A commanded by Lieutenant William H. H. Hutchinson. To the right is an M10 self-propelled gun of the 20th Anti-Tank Regiment RA.

Juno Beach

Although it was planned to spearhead the landings on Juno with DD tanks, this occurred at only two of the four sectors. AVREs disembarked first on the other two. The 38 DD tanks of the Fort Garry Horse were landed close to shore, since the sea conditions were too rough for swimming and they "deep-waded" into shore. Two DD tanks were quickly lost, one in a shell hole and the other after being swamped. The preliminary bombardment failed to silence the German defenses, and a 50mm pedestal gun in WN27 began engaging C Squadron, Fort Garry Horse, immediately hitting several tanks. LCT 317 managed to disembark two DD tanks, but then was hit by a volley of mortar and gunfire, drifting away from the beach in the process with three tanks still aboard. C Squadron was instrumental in the efforts to overcome several German strongpoints in Saint Aubin.

The engineer teams had greater success in clearing gaps through the obstacle belt at Juno than on Sword. However, the seawalls on Juno posed

ABOVE LEFT
Wrecked equipment including at least two DD tanks of the 13th/18th Hussars lies on Sword Beach in the Lion-sur-Mer sector. To the left of the nearest DD tanks is a D7 armored bulldozer.

ABOVE RIGHT
After landing at Sword, elements of the 13th/18th Hussars proceeded inland to link up with the 6th Airborne Division on the other side of the Orne River. This is a Sherman III named "Balaclava," the regimental headquarters tank of Lt. Col. R. T. G. Harrap. It is seen here on June 10, firing on German infantry who had been using Horsa gliders as cover during a counter-attack near Bénouville.

Troops of the Canadian Highland Light Infantry, 9th Canadian Infantry Brigade disembark from LCI(L)-299 on the Nan White sector of Juno in Bernières-sur-Mer around 1140hrs of D-Day as part of the reserve force. This area had been assaulted earlier in the morning by 80th Assault Squadron and several of its vehicles are evident. A deployed SBG bridge can be seen in place to exit the seawall in the center of the picture. There is one Churchill AVRE (1E) in front of the houses on the right, and another (1F) along with a Crusader III AA Mk I (40mm Bofors) on the beach near the seawall below. (LAC PA-137013)

A pair of Churchill AVREs, of 80th Squadron, 5th Assault Regiment RE immediately above the seawall on the Nan White sector of Juno in Bernières-sur-Mer. The Churchill AVRE to the right was tank 1D, commanded by Lt. John H. Saunders that landed from LCT(5) 2286 (LTIN 1408) on Nan White–Green Gap. The fortified villas in the background, dubbed "Denise and Roger," were captured by the Queen's Own Rifles in the early hours of D-Day at a cost of nearly a hundred men in the immediate vicinity. The house in the rear at the right, has been known for many years as La Maison des Canadiens (Canada House). (LAC PA-128789)

a significant issue, so for example, B Squadron of the Fort Garry Horse was trapped on the beach near Bernières-sur-Mer for over an hour until exits were cleared by the sappers. The regiment's A Squadron with deep-wading tanks landed a bit after the planned H+60, with some not arriving until H+4 hours.

The 1st Hussars tried launching from the sea, but German gunfire struck one LCT ramp, trapping four tanks aboard. One LCT tried to land its tank ashore, but struck a mine in the process, with one tank reaching shore, one sinking, and two more becoming trapped aboard. Eleven DD tanks of A Squadron were launched, but of the seven that made it to shore, one sank

A Crusader III AA Mk I of the 114 Light Anti-Aircraft Regiment RA stands guard above Nan Green Beach on Juno near a disabled DD tank of the 1st Hussars (6th CAR). Behind them is a German strongpoint, probably part of WN29 near Courseulles-sur-Mer. Elements of the 372 and 375 Batteries of the 114th LAA Regiment provided low-altitude air defense of Juno with about 30 40mm Bofors guns, a dozen of them the self-propelled version. (LAC PA-132897)

after prematurely deflating its skirt after its commander was killed, one was swamped after being stopped in the obstacle belt, and one was hit by 75mm gunfire. In one of its first engagements on shore, No. 3 Troop of A Squadron confronted a German 75mm bunker, losing one tank in the process but overcoming the strongpoint. A Squadron was slow to get off the beach owing to a lack of exits, and by the time it did, only ten tanks were still operational.

B Squadron launched from about 4,000yds offshore but four tanks sank, including the squadron commander's, which flooded when its skirt was collapsed by a nearby mortar impact. As a result, 14 DD tanks of B Squadron reached shore, but two were quickly swamped. In spite of the losses, the squadron proved to be very effective in dealing with the several German anti-tank gun bunkers in its sector. Eventually, nine tanks exited the beach, of which five were knocked out during the fighting inland. C Squadron, with 22 deep-wading Sherman V tanks, landed around H+45 but had problems exiting the beach until an AVRE deposited its SBG bridge over a trapped AVRE that had fallen into a crater.

Curiously enough, at least one of the Concrete Busters recorded a success when the two Sherman 17-pdrs on LCT(A) CB 2401 engaged and destroyed their assigned target, a bunker near Courseulles-sur-Mer.

Casualties in terms of men and landing craft were less severe on Juno than on Sword, and the Canadians managed to make a significant penetration off the beachhead. Tank casualties on Juno were highest in the 1st Hussars, with 33 tanks lost or broken down, and only 13 DD tanks operational by day's end; casualties among the late-arriving deep-wading tanks were less severe. Casualties in the RMASG battery were high after two of its LCT(A) sank en route to Normandy. The reinforcing armored regiment, the Sherbrooke Fusiliers, landed shortly after noon but saw little combat that day.

ABOVE LEFT
The most common anti-tank gun on the *Neptune* beaches was the pedestal-mounted 50mm gun, derived from surplus PzKpfw III tank guns. This particular Ringstand in Saint Aubin-sur-Mer was positioned to allow it to fire in enfilade along the beach's seawall. It knocked out four tanks of B Squadron, Fort Garry Horse (10 CAR). A Churchill AVRE of the 80th Assault Squadron RE put the bunker out of action with at least two of the impacts evident in this photo.

ABOVE RIGHT
"Bold," a Sherman V DD tank of the 1st Hussars (6 CAR), was commanded by B Squadron's leader, Major Stuart Duncan, on D-Day. While heading into Nan Green, Juno Beach, the tank was swamped by a wave with all but one crewman escaping. The tank remained underwater off Courseulles-sur-Mer until 1970 when it was recovered. It was restored in 1971 and now stands as a D-Day memorial in the town.

E

CLEARING A LANE, JUNO BEACH, D-DAY (OVERLEAF)
The various types of Funnies were intermixed on the LCT in order to deliver a team to create lanes off the beach. The usual plan was to deliver an AVRE carpet layer first to deal with any soft ground, then followed by mine-clearing and counter-obstacle tanks. Generally, the Crab flail tanks preceded the Churchill AVRE carrying accessories to permit passage over the seawalls that lined the beach. On Juno Beach, it was B Squadron of the 22nd Dragoons that provided the Crab flail tanks, as shown here to the left. Although the Germans usually avoided planting landmines in the tidal areas of the beach, there were mines located farther up on the beach. The most successful method for creating access over the seawalls was the SMBG Small Box Girder bridge, as seen here. These were quite awkward to move due to their size, but they proved far more functional than other alternatives such as the attempts to use fascine bundles.

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RODNA

ABOVE LEFT
A bogged Canadian Sherman V DD tank of the 1st Hussars photographed a few days after the landing by US Marine Corps observer Col. Robert Bare.

ABOVE RIGHT
The clay and soft sand at Juno trapped several tanks on D-Day, including this Sherman V Crab flail tank of B Squadron, Westminster Dragoons.

BELOW
A Sherman II DD tank of the 4th/7th Royal Dragoon Guards that landed on Gold Beach on D-Day. It was the practice to remove the skirt as soon as practical, since the impregnated canvas posed a potential fire hazard. This is a scene from later in June near Bayeux, with the screen, struts, and inflatable columns removed, but the lower frame still in place.

Gold Beach

Weather conditions off Gold Beach were so severe that the naval and tank commanders decided to land the DD tanks directly ashore from their LCTs. Due to congestion, the LCT(A) with the AVREs landed first, followed by the DD tanks. B Squadron, 4th/7th Royal Dragoon Guards landed intact and faced weak opposition. The AVRE tanks managed to knock out four German bunkers in WN35, which consisted of light ammunition bunkers for a pair of 20mm Flak guns in open Tobruks. C Squadron, 4/7 RDG had more trouble on arriving at the beach, losing three DD tanks in shell holes. On its eastern flank in La Rivière was strongpoint WN33, with a formidable 88mm PaK 43/41 anti-tank gun and a pair of pedestal 50mm anti-tank guns. These guns knocked out two Crabs and two AVREs before Capt. Roger Bell's Crab from the Westminster Dragoons engaged and knocked out the 88mm bunker. This German strongpoint was not fully cleared until 1000hrs by a combined force of Crabs, DD tanks, and AVREs supporting the 5th East Yorks.

The process of clearing the obstacle belt was frustrated by the incoming tide and a growing crescendo of German gunfire. The gapping process on Gold was less successful than on Sword and Juno. Some of this was due to a significant number of Crabs bogging down in the sand or clay. In spite of this, both B and C squadrons exited the beach relatively quickly, with modest losses. A Squadron arrived with its deep-wading tanks at H+60 but lost two tanks in shell holes. Overall, the 4/7 RDG lost only seven tanks on the beach. Tank casualties in 81 Squadron, 6th Assault Regiment RE were heavier with at least four AVREs knocked out; two Crabs of C Squadron, Westminster Dragoons were lost to gunfire and six more either bogged down or struck mines.

As the regiment began moving inland, they began to encounter the StuG III assault guns of Pz.Jg.Abt. 1352. B Squadron, 4/7 RDG encountered a single StuG III near Villiers-le-Sec, losing one DD tank before the StuG III was knocked out. A Squadron ran into several StuG III near Creully, having one tank disabled and four more knocked out before knocking out at least one StuG III. The incident sparked an

unfortunate friendly fire incident when the 4/7 RDG were mistaken for the German armored force and engaged by HMS *Orion* in the early evening. Overall tank casualties for the 4/7 RDG on D-Day were 19 tanks, of which three were from the friendly fire incident.

On the western side of Gold, the DD tanks of the Nottinghamshire Yeomanry encountered harsh sea conditions, and so the LCTs were instructed to land them on shore. Owing to the congestion in the landing area, B Squadron landed nearly half an hour late, after the infantry and other armored vehicles. C Squadron launched from about 700yds but were passed by LCT(A)s carrying AVREs and Crabs, which were first on the beach. C Squadron lost five tanks to swamping on the beach and two more knocked out by gunfire.

"Assegai," a Centaur IV close support tank of A Troop, 1 Battery, 1st Royal Marines Armoured Support Regiment that landed belatedly on D+1 and is seen here in Bernières-sur-Mer towards the eastern end of what is now Rue du Général-Leclerc looking across the intersection of Rue Barthélémy.

This section of the beach was covered by a 50mm pedestal gun in a Ringstand in WN36 and a much larger concentration of bunkers in WN37 in Le Hamel, including an 88mm bunker, a 50mm pedestal gun, and a fortified FT tank turret, along with supporting machine-gun Tobruks. A number of Crabs were hit from gunfire, as well as four of the five Centaur tanks of the 1 RMASC that had managed to land. WN37 was not finally secured by the infantry until late in the afternoon, and continual fire from this strongpoint seriously delayed the Crabs and AVREs from clearing obstacles. Some of the problems were attributed to the late arrival of the DD tanks of B Squadron.

Tanks of A Squadron, 24th Lancers landed on Gold Beach in the early morning hours of June 7 to reinforce the regiment's two squadrons that had landed on D-Day. This Sherman III was named "Armageddon."

A Churchill AVRE bobbin carpet layer of the 6th Assault Regiment RE bogged down in the Jig Green sector of Gold Beach, with the remnants of metal shuttering scattered near it. This was one of the types of matting that the bobbin could dispense.

The 231st Infantry Brigade Group was not exposed to the fire from WN37 and managed to exit the beach much more quickly, with the AVREs and Crabs in the lead. The deep-wading tanks of A Squadron arrived as planned at H+90, but with a portion of the beach closed due to continuing fire from Le Hamel, the landing area became so congested that the squadron was slow to exit. The Nottinghamshire Yeomanry lost 14 tanks on D-Day, but their contribution to the fighting was overshadowed by the Crabs of B Squadron, Westminster Dragoons, and AVREs of 82nd Assault Squadron, 6th Assault Regiment RE. A total of four AVREs of 82nd Assault Squadron were knocked out on Gold Beach on D-Day.

Omaha Beach

Two tank battalions were assigned to Omaha Beach, the 741st Tank Battalion on the eastern side in support of the 16th Regimental Combat Team (1st Division), and the 743rd Tank Battalion on the western side supporting the 116th RCT. As on many of the other *Neptune* beaches, sea conditions were poor.

On the approach to Omaha, the commanders of the two DD tank companies of the 741st Tank Battalion decided to launch the DD tanks from

F

1. SHERMAN V, F TROOP, 2 BATTERY, 1ST ROYAL MARINES ARMOURED SUPPORT REGIMENT, GOLD BEACH

The tanks of the Royal Marines Armoured Support Group painted an elaborate set of compass markings on the turrets of their tanks to assist fire direction from commanders off the tank. The tank names reflected the troop letter so, for example, "Fox." The red/white/red RAC flash was carried on both the hull sides and the center of the transmission cover on the front of the tank. The tank's name "Fox" was carried on the front of the tank above the RAC flash.

2. SHERMAN III, HQ SQUADRON, 13TH/18TH HUSSARS, 27TH ARMOURED BRIGADE, SWORD BEACH

This Sherman III named "Balaclava" was the regimental headquarters tank of Lt. Col. R. T. G. Harrap. The squadron insignia, a red diamond, can be seen in a very small size behind the tank name on the hull side. The tactical number is a large "10" in red with white outline. The Allied Star was carried in the usual position on the upper left side of the turret roof, slightly overlapping the side.

1

2

a range of 5,000–6,000yds. This proved to be a fatal mistake. Of the 16 DD tanks of Co. B, 11 sank and only two managed to swim to the beach. On LCT-600, the first tank sank immediately after leaving the ramp, and so the officer in charge, Ensign Henry Sullivan, decided to land the remaining 3 DD tanks ashore. As a result, only five of the DD tanks of the 741st Tank Battalion reached shore. Of the crewmen of the sunken DD tanks, 22 were saved by passing craft while 33 drowned. These five DD tanks were the first American troops ashore on Omaha Beach, and in spite of their small numbers, proved to be remarkably effective. One of the DD tanks that swam to shore spotted the 88mm gun bunker in WN61 and put it out of action with 75mm fire through its embrasure before it caused any American casualties. Another of the DD tanks knocked out two of the 75mm field gun bunkers in WN60 overlooking this section of the landing beach. Following the DD tanks were Co. A with deep-wading tanks. One LCT(A) sank in the rough seas before dawn, leaving 14 deep-wading tanks and seven tank-dozers. Two tanks and one tank-dozer were knocked out almost immediately, probably by the 50mm pedestal gun in WN61. This was one of the few remaining anti-tank guns in the immediate beach area, and it was eventually knocked out by bazooka fire.

The tank-dozers were assigned to assist the dismounted gap-breaching teams, which had been decimated by artillery and mortar fire. Through the course of the morning, the tanks provided covering fire for the infantry, knocking out several more bunkers in the process. The tanks suffered attrition from several causes – one tank drowned in the surf, two to mines, and five lost a track in the shingle. At 1100hrs, when the battalion commander attempted to rally the remaining tanks to push through Exit Easy 3 between WN61 and WN62, only three tanks were available. They attempted to push through the gully, but two of the three were knocked out in the process by 50mm anti-tank guns of WN62 on the hill above. By day's end, none of the Company A tanks were operable. Five reserve tanks landed in the afternoon, but by the end of the day, the battalion had been reduced to three tanks, with two more in repair and 48 lost or in need of major repair. Owing to the heavy losses suffered by the 741st Tank Battalion, Company B of the 745th Tank Battalion was landed in the late afternoon to support the 16th RCT attack on Colleville-sur-Mer that evening.

Tanks of Co. A, 741st Tank Battalion on an LCT(A) in harbor before D-Day. The M4 at the rear is fitted with a tank-dozer, although this is largely obscured by the other equipment. The M4A1 in the foreground is on an elevated timber firing ramp, and its armored ammunition trailer can be seen immediately behind it. The neighboring craft is LCT-213 of Flotilla 18, which landed M7 105mm self-propelled howitzers of the 62nd Armored Field Artillery Battalion on Fox Green, Omaha Beach at H+90. These LCTs were also part of the Gunfire Support Group, firing at the beach prior to the landings.

The situation of the 743rd Tank Battalion on the western side of the beach was dramatically different. Lt. (jg) Dean Rockwell on LCT-535 had led the training of both Army and Navy personnel associated with the DD tanks assigned to *Neptune*. He convinced the two Army tank company commanders that the sea conditions were too extreme for swimming the DD tanks. As a

A jumble of disabled vehicles on Omaha Beach in front of the E-2 Colleville Draw a few days after the landings. The M4 medium tank with the deep-wading trunks is "Axis-Buster" of Co. A, 741st Tank Battalion that became bogged down.

result, the LCT-6, with two companies of DD tanks, landed alongside the LCT(A)s with the deep-wading tanks and tank-dozers. Around H-Hour, the 743rd Tank Battalion had 32 DD tanks, seven deep-wading M4 tanks, and three tank-dozers ashore. The small number of wading tanks was due to the fact that some were drowned after being dropped in deep water, one LCT(A) managed to deliver only one tank before withdrawing with damage, and one LCT(A) was delayed in arriving by storm damage and did not disgorge its tanks until later in the morning.

Although the battalion landed largely intact, the tanks began to take heavy fire from two German gun bunkers in WN72, including one with an 88mm PaK 43/41 and the other with a 50mm pedestal gun. Four of the five LCT-6 landing DD tanks of Company B in the vicinity of the WN72 strongpoint suffered damage and casualties during the landing operations. The battalion commander, Lt. Col. John Upham, was severely wounded while directing fire against the German strongpoint. Company B eventually lost seven DD tanks during the day's fighting, mainly to gunfire from these two bunkers. Around 0830hrs, about two hours after the initial landings, US Navy destroyers began approaching closer to shore to provide badly needed fire support. Lacking direct radio contact, the USS *Carmick* (DD-493) began to observe the fire from the tanks of the 743rd Tank Battalion, and then engaged the same targets with 5in. gunfire. The USS *McCook* (DD-496) followed suit. Its deck log recorded that it began firing at one of the pillboxes along the beach at 0854hrs and

DD tank number B-4 of Company B, 741st Tank Battalion shed a track in the shingle on D-Day. It was one of only five DD tanks of the battalion to reach the beach. This provides a rare glimpse of the improvised exhaust chimney at the rear of the tank, added in the days before the landings to avoid asphyxiating the crew.

During D-Day afternoon, the Panzerjäger-Abteilung.352 of the 352.Infanterie-Division attempted to stage a counter-attack against US troops on Omaha Beach with some of its 14 Marder III tank destroyers. They were noticed by a US Navy spotter plane, and the attack was broken up by naval gunfire. Several of the Marders were put out of action, and the rest discouraged from any further advance.

ceased fire at 0858hrs after "pillbox demolished." Both bunkers suffered multiple hits through their embrasure from both tank guns and 5in. guns from nearby destroyers. Company C landed in a less defended sector of the beach and had only one tank disabled by German gunfire. By day's end, 17 tanks and seven tank-dozers had been disabled or knocked out. The reserve 747th Tank Battalion was not immediately needed and so landed on June 7.

Tank A-13, "Adeline II," of Company A, 741st Tank Battalion, being towed through Colleville-sur-Mer on June 7 by a T2 tank recovery vehicle. This tank was disabled during the D-Day fighting by an anti-tank gun strike against its bogies. The stacks of the deep-wading kit have been removed, leaving the trunk fittings.

Utah Beach

In contrast to Omaha Beach, the tank landings at Utah proceeded relatively smoothly. Paradoxically, they landed in the wrong sector but the German strongpoints there had been effectively reduced by the preliminary bombardments. The seas off Utah were much calmer than Omaha, and the two DD tank companies launched from 3,000yds. LCT-593 sank before reaching the beach, with the accompanying loss of four DD tanks. One DD tank was overrun by a landing craft during the run-in to the beach. Company B landed all its tanks successfully, so there were 27 DD tanks on shore shortly after H-Hour, preceded a few minutes earlier by the first waves of the 8th Infantry. Company C lost two LCT(A)s on the night before and one to a mine in the early morning hours. The remaining landing craft delivered 12 M4 deep-wading tanks and four tank-dozers.

"Cannonball," an M4 medium tank with deep-wading trunks of Co. C, 70th Tank Battalion that became trapped in a shell hole off Utah Beach on D-Day. This was one of the tanks fitted with the T40 Whizbang demolition rocket launcher with remnants still evident, including the trunnion for the launcher on the upper turret side and the rocket sight in front of the gunner's periscope.

Surviving German defenses in the WN5 strongpoint were unable to effectively resist the landings, but during the course of the day, five DD tanks and two deep-wading tanks were disabled by mines, bogged down, or suffered other misfortunes. After four reserve tanks were delivered in the afternoon, the 70th Tank Battalion had 40 tanks operational. The main objectives were to push down the causeways and past the flooded marshlands behind the beach, to eventually link up with the airborne landings. The tanks facilitated the link-up of the infantry and paratroopers later in the day. Company D of the 70th Tank Battalion landed its M5A1 light tanks later in the day and they were attached to the 101st Airborne Division. A medium tank platoon of the reinforcing 746th Tank Battalion arrived in the afternoon and the remainder of the battalion on D+1.

Company C, 70th Tank Battalion lands at Utah Beach on D-Day morning, with one of the battalion's half-tracks behind.

As the 8th Infantry began pushing inland from Utah over the Exit-2 causeway, a hidden German anti-tank gun disabled this M4A1 DD tank, number A-5 from Company A, 70th Tank Battalion. Following tanks pushed it off the road to make room for following vehicles.

The other D-Day

The original *Overlord* plan expected to simultaneously conduct Operation *Neptune* in Normandy and Operation *Anvil* in southern France. The timing of the *Anvil* landings was postponed until August due to a shortage of landing ships. Renamed *Dragoon*, the Mediterranean landing benefited from the experiences of *Neptune*.

The Invasion Training Center in Salerno, previously based in North Africa, had already prepared tanks for amphibious operations in Sicily and Italy. It managed the tank preparations for Operation *Dragoon*, including the training of tank crews on DD tanks transferred from Britain. To manage the landing operations, each of the three *Dragoon* beaches was assigned an Engineer Bridge Group: 36th EBG with the 3rd Division; 540th EBG with the 36th Division, and 40th EBG with the 45th Division. Each of these was assigned an engineer mine-clearing company to supervise the use of tank-dozers, tank scarifiers, and tanks with demolition rocket launchers. The scarifiers were a locally improvised mine rake based on the experimental T5 mine scarifier, but constructed on a normal M1 tank-dozer. The only rocket tanks available were the 7.2in. T40 Whizbang demolition rocket launchers, and there were not enough available to equip all three companies.

Each Gapping Team was also supposed to receive three Churchill AVREs, one of which was fitted with an SBG bridge. The Gapping Team of the 6638th EMCC of the 36th Engineer Beach Group did receive these, but apparently not the other two teams.

A total of 48 DD tanks arrived in Italy in late July and early August; two were lost during training. The plan was to use the DD tanks to spearhead

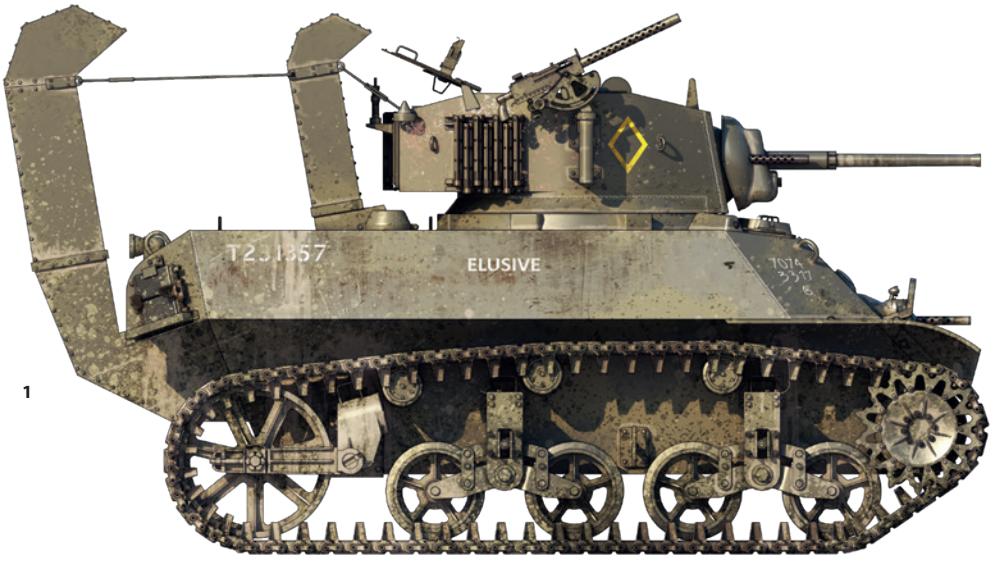
G

1. STUART V, 5TH ROYAL TANK REGIMENT, 22ND ARMOURED BRIGADE, 7TH ARMOURED DIVISION, GOLD BEACH

"Elusive," census number T231357 served with the headquarters squadron, so has a diamond tactical sign on the turret. The 5th RTR was the second regiment in the brigade, so the tactical markings were in yellow. The "E" name "Elusive" may refer back to the origins of the 5th RTR that derived from E Company of the Heavy Section of the Heavy Machine Gun Corps. The AoS markings on the right front mudguard included a red stag head, the brigade insignia, and a red square with white "52," indicating the second regiment of the brigade. On the left mudguard was the 7th Armoured Division's "Desert Rat" insignia; these markings were repeated on the rear as well. The chalked markings include the LCT number 7074, the Navy craft landing number below it, and probably the number for the tank loading sequence.

2. M5A1 LIGHT TANK, CO. D, 70TH TANK BATTALION, UTAH BEACH

Company D numbered its tanks on the rear of the hull side rather than the turret due to the extensive grouser stowage on the turret. Unlike the medium tanks, they generally appeared as plain white numbers. The vehicle name, starting with the company letter, was also carried on the hull side. The "Joe Peckerwood" cartoon was painted on the forward sides of the hull. Behind this on the left side was a paper warning label instructing the crew to remove the waterproofing before operating the tank. An Allied Star was painted on the turret roof and on the front glacis plate. The bumper codes were 1A 70 D-12. This company was attached to the 101st Airborne Division later on D-Day, and this particular tank was knocked out by a German anti-tank rocket farther inland at a location later called "Dead Man's Corner."



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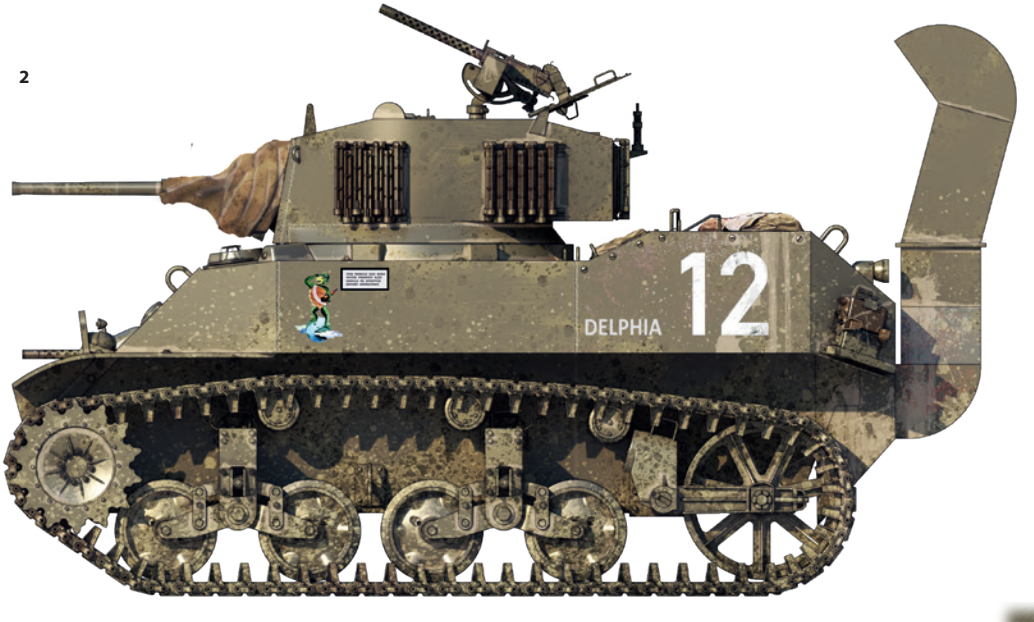

The 6638th Engineer Mine-Clearing Company, 36th Engineer Beach Group is seen here practicing with specialized equipment intended for the Operation *Dragoon* landings in southern France. The locally built mine scarifier on the front of the M4A4 tank was improvised using an M1 dozer and was based on the T5 mine scarifier design. To the left is a Churchill AVRE with Small Box Girder (SBG) bridge, one of three Churchills used by the Gapping Team of Alpha Force in support of the 3rd Infantry Division during the landings. The piping near the M4A4 is M2 demolition snake.

the landings, starting at H-Hour (0800hrs) on August 15, 1944. They were distributed as follows.

Division	Beach	Tank Battalion	DD Tanks
3rd Division	Alpha	756th Tank Battalion	8
36th Division	Camel	753rd Tank Battalion	16
45th Division	Delta	191st Tank Battalion	12
VI Corps Reserve	-	-	10

"Defiance," an ex-British Sherman V (M4A4) fitted with an M1 tank-dozer, seen here on the beach at La Nartelle, near Sainte-Maxime in southern France on August 15, 1944 during Operation *Dragoon*. This tank-dozer was attached to the 40th Engineer Beach Group assigned to mine-clearing operations for the 45th Infantry Division.

The 756th Tank Battalion deployed one platoon to each of the two landing beaches. On Alpha Beach 256 Yellow in Cavalaire Bay, four DD tanks were launched from 2,500yds and one tank was sunk by a passing landing craft. The three remaining tanks landed successfully but one DD tank was disabled by a landmine. Otherwise, there was no opposition on this beach. The other platoon landed on Alpha Beach 259 Red. The four tanks were launched from 2,500yds. One tank was accidentally hit by a naval bombardment rocket, killing the commander; moments later, it struck a mine 25yds offshore, sinking the tank. This platoon engaged German defenses in the beach area.

The 191st Tank Battalion had three DD tank platoons. One LCT-6 planned to land its platoon on Delta Beach 263A Red, east of Sainte-Maxime, but struck a shoal. As a result, the tanks swam the remaining 75yds to shore. All four tanks struck landmines above the high water mark and were disabled. The other two platoons

were landed on Delta Beach 263 B Yellow and 263 C Blue. All landed successfully and only encountered machine-gun fire.

The 753rd Tank Battalion launched two platoons from 4,000yds off Camel Beach 264B Green, east of Saint-Raphaël. One tank was damaged by German 20mm fire but all eight tanks landed successfully. A German self-propelled gun counter-attacked the landing site but was knocked out by the tanks. The other two platoons were scheduled to land on Camel Beach 264A Red near Fréjus. This beach was defended by the strongpoint Stützpunkt Tiger and the volume of fire that greeted the approaching landing craft convinced the US Navy to shift the landing to Camel Beach 264B Green. Both DD tank platoons landed there in the afternoon against little opposition. Overall, the use of the DD tanks during Operation *Dragoon* was considered a success. The scarifiers and tank-dozers proved very useful, but it is not recorded whether the Churchill AVRE with SBG was used.

An M4A1 Donald Duck tank of the 753rd Tank Battalion at Camel Green Beach, east of Saint-Raphaël on August 15, 1944 during Operation *Dragoon*, with the castle of L'île d'Or visible in the background. This tank was hit by German 20mm fire during the approach to the beach, but managed to knock out the German gun. It is seen here being used as a medical aid station.

BATTLE ANALYSIS

The five British/Canadian armored regiments used about 190 DD tanks on D-Day. Of these, only one-third (62) actually swam to shore, while two-thirds were either directly landed on shore or "wet-waded." Of those attempting to swim to shore, one-fifth (11) sank. A total of 13 DD tanks were swamped near shore, since the DD tanks did not have waterproofed engine decks like the deep-wading tanks.

The three US tank battalions had 92 DD tanks on D-Day morning, of which 57 (62%) attempted to swim to shore, with the remainder landed by their LCTs. Of those launched at sea, 28 sank, all but one of these with the ill-fated 741st Tank Battalion. The US battalions tried to swim a far larger percentage of their DD tanks to shore, and in the process took far more substantial losses to sinking. In contrast, all three companies of deep-wading tanks landed successfully, except for those lost at sea and one which drowned in a shell hole near the beach.

Not surprisingly, the British and American viewpoints on the DD tanks were drastically different. The secret final report of the 79th Armoured Division concluded that, "DD were an important factor in the success of D-Day. Never before had tanks led an assault of this nature, they were in the forefront of the battle and literally swamped the defenses with the weight of their armor. There are many instances of the excellent support they gave, even under adverse conditions."

In contrast, most US Army and Navy officers considered the use of DD tanks on D-Day to be a mistake. The commanders of the three US tank battalions that employed the DD tank on D-Day concluded in their report that, "the DD device was not satisfactory for the purpose intended, and that medium tanks can be landed more effectively from LCTs directly onto

the beaches than swimming in. Losses, in fact, were lower among the units landing directly on the beach." The commander of Assault Force O in his after-action report to the Eleventh Amphibious Force concluded that, "Because of the vulnerability of its flotation equipment and the general unseaworthiness of the entire vehicle, the DD tank is not a practicable weapon for use in assault landings on open beaches…" The American viewpoint differed from that of the 79th Armoured Division in that the US Army preferred a readily available and more reliable alternative to the DD tank, namely conventional tanks fitted with deep-wading equipment landed close to shore by LCT.

Assessments of other specialized armored engineer equipment varied. The Crab tanks had been assigned to flail lanes on the beach even though it was understood before *Neptune* that flail tanks were not especially valuable in soft sand. Furthermore, the Germans generally did not plant anti-tank mines in the tidal zone, since the wave action exposed the mines and caused fuse failure. The Crab was not especially efficient against anti-personnel mines such as the S-mine. Allied planners recognized these issues, but advocated flailing operations on the beaches out of caution. Regardless of their mine-clearing role on the beaches, the fact that Crabs could use their guns provided an invaluable reinforcement to other tanks on the beaches, especially when the Crabs arrived in advance of the DD tanks. They were credited with the destruction of numerous German gun bunkers and defenses. The utility of the Crabs in mine clearance was better exploited in subsequent operations following the landings.

In general, the schemes to clear gaps through the obstacles during the initial stage of the Normandy landings had disappointing results. Reliance on unprotected sappers and engineers to conduct most of this process was unrealistic, and the scheme to use explosives to deal with obstacles was shortsighted owing to the presence of so many troops nearby. Furthermore, the oncoming tide did not give the breaching teams sufficient time to conduct their work. The lanes were not completed until later in the morning, when AVREs and bulldozers could be sent to crush or tow away the obstacles.

The Churchill AVRE received mixed assessments. The secret final report of the 79th Armoured Division admitted: "The only reason that the Churchill tank was accepted as an AVRE was that no more suitable armored vehicle was available at the time. It is in many respects unsatisfactory as such. It was overloaded by some equipment, lacked mechanical essentials such as a winch and, in consequence, manipulation of its devices not infrequently failed in battle. The worst consequences were often mitigated at the cost of valuable lives."

The Petard spigot mortar proved valuable against walls and defended houses, but its value against bunkers has been widely exaggerated. Its main flaws were its short range, lack of accuracy, slow reload time, and dangerous reloading process. The old Fuze 289 proved unreliable compared to the newer Fuze 291. The AVRE had to be used in conjunction with normal tanks since it was vulnerable to enemy anti-tank weapons outside the meager range of the Petard.

Evaluations of the AVRE accessories were quite mixed. A report by the 82nd Assault Squadron concluded that the Roly-Poly was, "a futile device, more of an obstacle to ourselves than a help to anybody. In no single

case was it successfully employed… a potential danger to the remaining vehicles on the craft." The bobbin was viewed more favorably, with the 82nd Assault Squadron concluding that, "this appeared to be partially successful." The SBG bridge was viewed skeptically before D-Day because of its size and awkwardness, but it was put to good use on several beaches to overcome seawalls. The fascines proved useful in anti-tank ditches, but plans to use them as a means to overcome seawalls proved to be unsuccessful. External stowage of Bangalore torpedoes on some AVREs was a dangerous failure, since they were vulnerable to enemy fire as described previously. The Churchill Crocodile flamethrower tank was hardly used at all during *Neptune*, but later went on to become one of the most valuable weapons of the 79th Armoured Division.

FURTHER READING

The D-Day landings are covered in considerable detail in a wide range of books. The British side of the armored operations on D-Day is covered more thoroughly than the American or Canadian experience due to the fascination with the 79th Armoured Division and its Armoured Funnies. An antidote to the uncritical boosterism of many of these books is the recent study by Richard Anderson that takes a more analytical look at the performance of the Funnies on D-Day. Besides the published sources, I made extensive use of archival records in the preparation of this book.

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Glossary

AFV	Armo(u)red Fighting Vehicle
AoS	Arm of Service
DD	Duplex Drive tanks
FUSA	First US Army
LAA	Light Anti-Aircraft
LAC	Library and Archives Canada
LCM	Landing Craft Mechanized
LCT	Landing Craft Tank
LSD	Landing Ship Dock
RA	Royal Artillery
RAC	Royal Armoured Corps
RE	Royal Engineers
SP	Self-propelled (gun)
TO&E	Table of Organization and Equipment (US Army)
WN	Widerstandsnest